

AN ACCIDENT OF VALUE:
A MARXIST – VIRILIAN ANALYSIS OF DIGITAL PIRACY

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Abstract

Using Marxist value theory, in particular the circuit of capital, and elements from Paul Virilio's theory of speed, this thesis argues that digital piracy is an accident of value that occurs when circulating capital crashes into the wall of real time.

During accumulation capital must metamorphose from money into commodities and back into more money and move between the spheres of production and circulation. The faster capital can complete its circulatory movement, the more capital functions to produce surplus value and therefore more capital can be accumulated. However, there is a limit to this acceleration – if capital accelerates beyond a certain limit it cannot assume its particular forms, which has disastrous effects for the accumulation of capital. I argue that this limit is identical to the limit of absolute speed and that capital can achieve this velocity through adopting telecommunications as its medium.

Under the pressure of telecommunications, the extension and duration of capital in space and time is compressed into an instantaneous and ubiquitous moment in real time. When this occurs both the circuit and forms of capital disintegrate.

Key words: digital piracy, political economy, dromology, value theory, commodity, capital, telecommunications, speed, Paul Virilio, Karl Marx.

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Table of Contents

Certificate of examination.....	ii
Abstract	iii
Acknowledgements.....	iv
Table of contents	v
Introduction.....	1
Chapter 1: The commodity, capital and the velocity of circulation	9
Value and the commodity form.....	10
The circuit of capital and its stages.....	13
Capital as the unity of the three forms.....	18
The dialectic of production and circulation	20
The accidental reality of the circuit	22
Barriers.....	26
From barriers to absolute limit.....	32
Chapter 2: From real space to real time	36
Virilio and the compulsive logic of speed.....	36
Metabolic speed and real space.....	37
The dromocratic revolution and technological speed	39
The revolution in transmissions and real time	43
Non-space	46
Time and non-time	48
Immediacy and interactivity	49
Generalized arrival.....	50
The primacy of the accident.....	53
Chapter 3: The circulation of capital in real time and the digital piracy accident	67
Accidents of value.....	69
An overview of the circuit of capital in the music industry.....	74
Capital's speed limit	77
Digital distribution: immediate real time.....	78
Digital piracy: simultaneous real time	87
The extent of the digital piracy accident.....	102
Digital Rights Management	110
Afterword.....	119
Media: the logistics of capital	120
Bibliography	129
Appendix 1: Fuchs' example of capital accumulation online	143
Appendix 2: The impact of digital piracy in Fuchs' example.....	145
Appendix 3: The temporal contradiction of real time and its relationship to the contradiction between gift and commodity exchange	147
Appendix 4: Internet traffic management and streaming.....	150
Vita.....	153

Introduction

Piracy is typically defined as intellectual property theft and can refer to a range of activities, including commercial, industrial-scale counterfeiting of material goods (so-called Asian piracy), commercial and non-commercial online streaming sites, non-profit home taping, signal piracy, broadcast piracy, public performance piracy, peer-to-peer file trading networks, warez sites, “chipping” of video game consoles and cracking of copy protection (Dyer Witheford and dePeuter 2009; Johns 2009; Walls 2008; OECD 2008; 2009). Digital piracy¹ is typically defined as the unauthorized reproduction and distribution of copyrighted digital works, such as music, movies, books and video games. Although digital piracy can be commercial, the form of digital piracy I will analyze is individual and non-profit. I further narrow my definition of the phenomenon to refer to piracy that relies solely on the internet as a medium for reproduction and distribution.²

Digital piracy currently concerns those branches of production that produce and/or distribute digital commodities. It affects the industries of music, movies, television, radio, software and publishing. In other words, digital piracy mainly affects the culture industry. In the near future, however, digital piracy may affect more and more branches of production. When advanced 3D printers and scanners become low-cost consumer items, downloading and printing out, say, a fully functional mobile phone may be as easy as it is to download a song or movie today.

Although intellectual property piracy has existed since the advent of print culture in the fifteenth century (Johns 2009), digital piracy represents a quantitative and qualitative shift in piracy. Today, any consumer with access to a computer and internet connection can download a perfect reproduction of a movie, book, song or computer

1 The phenomenon is can also be referred to as internet piracy, filesharing or digital reproduction. I prefer digital piracy because it draws attention to digital code.

2 This definition is close to the OECD's: “copyright infringements that do not involve the use of physical media (such as CDs, DVDs, and flash drives) as the means of passing music, film, and other content from pirate to consumer” (2009:16). The type of digital piracy I focus on in this thesis is relies on peer-to-peer (p2p) networks (e.g. Napster, Audiogalaxy, KaZaA, KaZaA Lite, Limewire, Frostwire, Morpheus, Edonkey, Souleseek, BitTorrent, Grokster), webblockers (Hotfile, Rapidshare, Storage.to, Megaupload) or, to a lesser extent, streaming sites (e.g. YouTube, Last.fm, Megavideo).

game for free rather than paying for it. Digital piracy occurs on a massive scale in peer-to-peer networks and on the World Wide Web. While there are no reliable statistics on the extent of the phenomenon (GAO 2010; OECD 2008; Gillespie 2007a), representatives of the culture industry claim that on the internet 95% of music and 80% of movies are pirated, and that 40% of computers worldwide run pirated software (IFPI 2010; 2009; BSA 2009). Digital piracy is given as the reason for the 30% drop in global music sales between 2004 and 2009 (IFPI 2010). While these claims are likely exaggerated, there is no question that the phenomenon of digital piracy is widespread. Although skeptical about the possibility of precisely quantify the extent of digital piracy, Tarleton Gillespie writes that it occurs at a “bewildering rate” (2007a:50).

A search of academic databases, using the terms “digital piracy”, “internet piracy”, and “filesharing” yields a majority of articles discussing the phenomenon from a legal and economic standpoint. Digital piracy is typically framed as a problem of the existing intellectual property rights regime; it is either too weak or too strong. Alternatively, the focus is on whether reproduction of digital data is theft, considering that possession and consumption of computer files is non-rivalrous (see, e.g. Gillespie 2007a; Rimmer, 2007; May 2007; Alderman 2001; Lessig 2001; Litman 2001). Economic analyses typically focus on the extent and impact on the culture industry’s revenues, profits and distribution systems (see, e.g. Ahn and Yoon 2009; Walls 2008; Oberholzer-Gee and Strumpf 2007; Leibowitz 2006; Zentner 2006; Leyshon et. al. 2005 Jones and Lenhart 2004; Peitz and Waelbroeck 2004). Some literature considers digital piracy from anthropological economics, conceptualizing it as high-tech incarnation of the primitive the gift economies that Marcel Mauss (1954) and Bronislaw Malinowski (1984) theorized (see, e.g. Fuchs 2008:157-212; Currah 2007; Barbrook 2005; Leyshon 2003; Slater 2000).

Avoiding legal and economic analyses, this thesis approaches digital piracy from a Marxist standpoint. Because music, movies and games are downloaded without any payment involved, a starting point for a Marxist analysis should be the commodity form,

whose essence is to be bought and sold. The existence of digital piracy suggests that the commodity disintegrates online.

Some Marxists theorists (see, e.g. Lohoff 2006; Schiller 1997) suggest the commodity vanishes because of the special characteristics of information and digital data. It is non-rivalrous and can be perfectly reproduced. The commodity disintegrates when it assumes the form of binary code. While I agree that digitization is a piece of the puzzle, it is theoretically unsatisfactory to explain the commodity's demise only in terms of the special features of the digital. After all, digital commodities do exist and are sold by successful businesses such as Apple's iTunes Store and Amazon.com, Inc.'s various web-stores. To understand why the commodity disintegrates, it is crucial to understand that the commodity is part of the circulation of capital. When capital circulates, it metamorphoses from money into commodities and back again.

Nick Dyer-Witheford (1999) recognizes that the commodity is just a particular form of capital. He suggests that the reason piracy occurs in digital computer networks is the speed of capital's transformation from the commodity to the money form. He relies on an evocative passage from the *Grundrisse* (Marx 1973), in which Marx observes that if the metamorphosis of capital occurs too quickly, "as it does in the mind, where once concept turns into the next at the speed of thought," the transformation of capital from commodity into money will not occur. Capital "must spend time as a cocoon before it can take off as a butterfly" (1973:548-549). Dyer-Witheford argues that when capital uses digital computer networks as a circulation medium, use-values are disseminated at such speed that they cannot be contained in the commodity form; they are transformed into "instant butterflies" (1999:202). Although he does not provide an in-depth argument, Dyer-Witheford provides the theoretical point of departure: the acceleration of circulating capital.

Based in the acceleration of capital as a point of departure, this thesis uses the theoretical framework of Marxist value theory combined with elements of Paul Virilio's speculative theory of speed to analyze digital piracy. The questions that have guided my research are: Why and how does digital piracy occur? How does digital piracy connect to

the metamorphoses of capital? What is the relationship between digital piracy, speed and the circulation of capital? How is digital piracy a function of the increasing velocity of capital? How can digital piracy be conceived of as an accident of value? How does the commodity form disintegrate?

In the Marxist literature on media and communication in capitalism, few texts use the circulation of capital as a point of departure or core analytical concept. Publications tend to be, as Nicholas Garnham (1990) and Christian Fuchs (2009a) argue, fragmentary and centered on production or ideology rather than on capitalism as an integrated system of value (see e.g. Artz et. al. 2006; Wayne 2003; Golding and Murdock 1997; Mattelart and Sieglau 1979; 1983; de la Haye 1979; Hall 1977; Smythe 1977).

Garnham argues that ever since cultural studies won the war against political economy, the field of critical communication studies is dominated by idealism, the concept of ideology and the base-superstructure problematic (1990:20-29). Dallas Smythe's (1977) contributions notwithstanding, media and communications are still a blindspot in Marxism because they are not analyzed using core concepts, such as value, labour and circulation. Garnham calls for an approach to Marxist theories of communication that eschews the vertical base-superstructure approach for one that treats capitalism as a horizontal "process which is continuous, circular and through time" (Garnham 1990:45). According to Garnham, the circulation of capital, in essence classical Marxist value theory, is the "crucial starting point for any political economy of mass communication" because it refocuses analyses of communication on capital's physical, spatial and temporal moments of its self-realization (Garnham 1990:45). He suggests that a comprehensive analysis of most media phenomena can be gained from a focus on the circulation of capital (Garnham 1990:45-53).³

Although Garnham made his suggestion twenty years ago, the field of Marxist media communication studies is still dominated by base-superstructure. In my review of the literature, Dyer-Witheford (1999) and Fuchs (2008; 2009a; 2009b; 2009c) appear to be the only scholar who have followed Garnham's suggestion. Fuchs argues that for a

3 Garnham briefly mentions piracy ("license evasion") as "consumer resistance" (1990:50).

“systematic location of the media in capitalism, one can take as a starting point the Marxian circuit of commodity metamorphosis and the accumulation of capital as it is described in Vol. 2 of *Capital*” (2009a:377). The benefit of using the circuit of capital is that Fuchs is able to treat capitalism as a system of production, circulation and consumption that includes both commodities and ideologies. Based on the various roles media performed in the production and circulation of commodities and ideologies, Fuchs manages to integrate a wide range of media phenomena into a unified theoretical framework, including: spatial and temporal co-ordination of production; rationalization of production; centralization of media capital reducing turnover time; globalizing trade; advertising; naturalization of capitalist ideology; and alternative media (2009a).

This thesis can, in part, be read as an argument for and an application of value theory and the circuit of capital to the study of media, by using digital piracy as a case study.⁴ Although Garnham, Dyer-Witheford and Fuchs provided the original inspiration and point of departure, the Marxist theoretical framework I construct in chapter 1 relies mainly on the primary literature because its purpose is to establish how and why the circulation of capital must accelerate and to update Marx’s theory of the circulation of capital up to the age of telecommunications and digitization.⁵

While I do not believe that Marx’s analysis of capitalism is voided because of technological change, his theory must be refined to account for the radical different

4 I recognize, however, that digital piracy can be analyzed using the base – superstructure approach. The history of illegal downloading has been very much a legal, ideological and semantic struggle. Tartleton Gillespie argues that the culture industry has been at pains to give cultural legitimacy to their clampdown on digital piracy and to bring both public and private institutions into ideological alignment against the phenomenon (2007a:105-135). For example, the culture industry has sought to do this by applying the label of pirate and piracy to the phenomenon, hoping to give it negative connotations of theft, destruction and violence. However, digital pirates have willingly adopted the term, turning it something they view as positive. The best examples of this are the BitTorrent tracker The Pirate Bay and the founding of various political Pirate Parties worldwide. The semiotic struggle over “piracy” appears to have been lost as copyright holders are now arguing that the term is too sexy and adventurous (Anderson 2010). Furthermore, an ideological/subject approach to digital piracy could focus on how and why the ideological obedience to property rights in the digital environment appears to have crumbled.

5 Although Garnham, Dyer-Witheford and Fuchs mention the acceleration of capital, it is not the focus of their respective texts. Although some Marxists have discussed speed and capital, they have not connected speed theoretically to the circuit of capital (see e.g. Hassan 2009; Jessop 2009; Graham 2000; 2006).

nature of tele-technologies compared to previous means of communication. Marxist or Marx-inspired theorists have analyzed the impact of information and communication technologies (ICTs) and its speed on capitalist production, circulation and general social organization (see e.g. Hassan 2009; 2007; Davis, Hirschl and Stack 1997; Graham 2006; Harvey 1989). Apart from noting that ICTs have been crucial to the intensification of labour and reduced capital's overall turnover times, these theorists have not drawn out the implications of the speed of telecommunications for the circuit and metamorphoses of capital.

Relying only on Marxist theory to approach to the speed of telecommunications is inadequate. To analyze digital piracy and the disintegration of the commodity form as a function of the acceleration of capital, I bring Marx up to speed by using elements of Paul Virilio's dromology (1977; 1990; 1991; 1994; 1995; 1997; 1999; 2000a; 2000b; 2005; 2007; Virilio and Lotringer 2002; 2008).

Juxtaposing Virilio with Marx may appear to some readers as odd. On the one hand, Virilio is generally hostile to Marxism; he finds the notion of class struggle ridiculous refers to historical materialism as "sinister" (Armitage 2000). On the other hand, Marxists typically dismiss Virilio for having little to offer a critique and analysis of capitalism (see e.g. Hassan 2008; Kellner 1999:119-121; Harvey 1989).⁶ The purpose of my juxtaposition, however, is not to make Virilio a Marxist or vice versa, or, as Armitage (2006) does, rescue Virilio as a critic of international business and capital. I am interested instead in what Virilio's concept can do when applied to Marx's political economy.

Dromology is the science of the logic of speed; it studies the nature of speed, the conditions of its emergence, its transformation and effects. At the core of Virilio's speculative theory of speed is a phenomenological preoccupation and concern for the human body. Influenced by the phenomenology of Maurice Merleau-Ponty (2002; 2008), Virilio's theory and individual concepts analyze how bodily orientation in space impacts human experience of phenomena (James 2007:9; Virilio and Lotringer 2002:57).

6 Federici and Caffentzis (1987) even ridicule Virilio's in their "review play" on Virilio and Lotringer's (2008 [1983]) *Pure War*.

Technological motors of speed alter our bodily orientation in space, therefore changing how we perceive and interpret phenomena, in particular reality, space and time. Although comprehending Virilio's theory at first requires reading him on his own terms, his concepts can be applied outside of a phenomenological framework.⁷ I do not believe it is necessary to stay true to the original concept of the Author.⁸ For the purposes of this thesis, I use Virilio as a historian and geographer of speed.

In my review of the literature, only Armitage and Graham (2001), in their contribution towards a political economy of speed (dromoeconomics), have juxtaposed Marx and Virilio. They argue that Virilio is relevant for the analysis of capitalism because "hypermodern" capitalist societies are constantly on-the-move and are inherently configured by acceleration. They suggest that dromology can be brought to bear on the spatial and temporal aspects of production and circulation, and argue that the current "hypercapitalist" society is "associated with [the] speed-of-light infrastructure of communication technologies" (Armitage and Graham 2001:114-115). While these connections are valuable in the context of my thesis, unfortunately Armitage and Graham do not develop them, focusing their synthesis on a dialectic of international war and trade. Unfortunately, their dromoeconomics is production centric; they ignore *Capital Vol. 2* and, in my opinion, fail to connect dromology with the spatial and temporal moments of capital because they do not consider its capital.

In chapter 2, I introduce the Virilian concepts I will use to interrogate the circuit of capital that occurs in a technological context of digitization, telecommunications and digital computer networks. I discuss Virilio's conceptualization of geographic "real space", analyze how speed is a compulsive force that must accelerate up to the absolute speed of light, which creates the "electronic space" of "real time." In the context of real

7 I have not completely discarded Virilio's phenomenology. In some cases, however, I will rely on Virilio's phenomenology because it will do more for my overall argument. For example, my use of the concepts of substance and accident and the reversal of their relationship makes sense only when I consider them from a phenomenological point of view.

8 Steve Redhead argues that Virilio has always been suggestive and left certain aspects of his work implicit, and that the reader is left to pursue further reading and study. (2004:138, 159). While Virilio focuses on matters of war and politics, it is possible to apply to political economy what is implicit or what he suggests with his concepts.

time, I introduce “generalized arrival” and “the accident”, concepts which enable me to explain what actually occurs when circulating capital relies on digital computer networks as its circulation medium.

In chapter 3, I analyze how the absolute speed of tele-technologies affect the circulation of capital; how capital reaches absolute velocity in digital computer networks; and how the digital piracy emerges as an accident of value after capital crashes into the wall of real time.

Chapter 1: The commodity, capital and the velocity of circulation

[Capital] must spend time as a cocoon before it can take off as a butterfly (1973:549).

The commodity is the elementary form of bourgeois wealth and is the fundamental category of Marx's analysis of capital. The most important aspect of the commodity for the purposes of this thesis is that it is an objectification of value, in other words, of human labour. Value can never appear as itself and must assume other economic and/or material forms to exist, and value always has to possess the commodity before it can take on other forms. The commodity as a container of value is the presupposition for the appearance of capital. The commodity is internally divided into value and use-value, and through exchange, into an external opposition between money and commodities (Marx 1976:199). This external division is, in turn, the basis for the formation of capital as an integrated system of value that depends on the continuous metamorphosis of money into commodities and back into more money. As soon as capital takes over social production, the commodity becomes a result and a form of appearance of capital. Only when the commodity is part of the circulatory movement of capital can it accelerate, crash into the barrier of real time, and thereby disintegrate. The relationship between digital piracy and the commodity form only makes sense when the form and function of that particular economic form is related to the circulation of capital.

This chapter begins by relating the commodity form to the other forms of capital, including its universal form, i.e. the circuit. The main purpose of this chapter, however, is to establish why and how circulating capital accelerates. Based on my reading of *Capital vol. 2* and the *Grundrisse*, I argue that the source of acceleration, indeed capital's need for speed, is found in its metamorphosis from universal to particular forms in its movement from one stage to the next, and in the dialectic of production and circulation. The spatial extension and duration of capital in the sphere of circulation appear as barriers to capital's movement, which must be overcome to release its potency. I establish that the commodity

is the most precarious form of capital because the sale is most difficult stage to complete, and therefore also the stage with the longest duration. While capital tries to overcome the barrier of circulation time in general, in particular it tries to abbreviate the sale and the duration in which capital assumes the precarious form of the commodity. Reducing circulation time and speeding up the moment of exchange may, however, have the opposite effect of increasing the precarity of the commodity form to the point of its elimination. By crossing the threshold of zero circulation time, capital reaches absolute velocity and crash into the wall of real time.

Value and the commodity form

The commodity is an external, sensuous object that appears as a useful thing that satisfies needs through its qualitative properties, such as the nutritional content of food or the function of a hammer. The usefulness of a commodity constitutes its use-value, which is realized through individual consumption as means of subsistence or through productive consumption, as the elements of production. Use-values represent the qualitative content of wealth and are indifferent to the social form of wealth, which is the quantitative property of commodities (Marx 1973: 404; 1976:125-26).

The commodity is a unit of private property that can be bought and sold. In exchange, commodities assume the social form of exchange value, which is the quantitative relation in which one set of commodities (use-values) is exchanged for another (x commodity A = y commodity B). Because commodities are commensurable in certain ratios, they share, a “common element of identical magnitude” (Marx 1976:127). The two sets of commodities must therefore be equal to a third element, which is neither use-value nor exchange value. Marx argues that if the use-values of commodities are disregarded, only the property of being products of labour remains (Marx 1976:128).

A use-value is a particular outcome of a particular labour process, such as the labour of producing shoes. If we disregard use-value, the associated particular labour that produced the commodity must also be disregarded. After this abstraction all that remains

from diverse labouring activities, such as spinning, weaving and computer programming is just human labour in general, or abstract human labour. Commodities are thus “congealed quantities of human labour, i.e. of labour-power expended without regard to the form of its expenditure” (Marx 1976:128). Human labour forms the social substance that Marx refers to as value, which is measured by the labour time spent to produce the commodity.

While labour is the value-forming substance, it is not value itself. Value cannot appear by itself nor is it a property of an object. The performance of labour brings value into being alongside use-value in the economic and material form of the commodity. However, value is only potentially value until it is realized in the social process of exchange. Because value does not have an independent material existence, it is thus only socially valid.

The commodity is a dialectical contradiction of value and use-value. In dialectics, contradictions must somehow be resolved, which leads to either the negation of the dialectic or to a new form of appearance. In the case of the commodity the internal contradiction results in the appearance of exchange value – a form of appearance of value – and in the materialization of use-value in commodities and value in money. Money materializes from the process of exchange because any and all commodities express their equivalent value in a specific quantity of any other commodity. Through custom commodities start to communally measure their value in the same particular equivalent form, which then becomes the universal equivalent of the money form (Murray 1998:38; Lebowitz 1992:59; Marx 1976:138-163).

An analysis of the process of exchange illustrates how value metamorphoses from commodities into money and how money crystallizes from this process. It prefigures my discussion of capital, because money is the first form of appearance of capital and because capital is a shape-shifter just like value.

Prior to the capitalist mode of production, commodities were produced by self-employed labour for the purpose of barter and then for simple exchange. Marx refers to the latter as the circulation of commodities: a commodity (C_1) is converted into money

(M) and then converted into a different commodity (C_2), or simply $C_1 - M - C_2$.¹ The two conversions represent the economic functions of selling ($C - M$) and buying ($M - C$), and $C - M - C$ is best described as selling in order to buy. The purpose of the exchange is the satisfaction of needs. For example, a shoemaker produces shoes that are sold for money to buy bread from a baker. From the point of view of labour, the circulation of commodities is nothing but the exchange of one kind of particular labour for another (Marx 1976:250-51).

$C - M - C$ is a process in which value goes through two metamorphoses. When the commodity is sold ($C - M$) value transforms from the commodity form into the money form, and when a commodity is bought ($M - C$) value leaps from money into the commodity.² In this process both money and the commodities function as different modes of existence of value (Marx 1976:255). The circulation of commodities is therefore a qualitative process as value merely changes form (from C_1 to C_2) and does not increase its quantity.

Capital arises from the simple production and exchange of commodities; if the material content of exchange is disregarded, “we find that its ultimate product is money [which] is the first form of appearance of capital” (Marx 1976:247). Capital subsequently assimilates both the commodity form and the circulation of commodities into its “life process.”

Marx first introduces capital as the circulation form of $M - C - M'$, where $M' = M + \Delta M$. M' is the initial sum advanced plus the increment of surplus-value (ΔM) (1976:256). In this process a quantity of value in money-form (M) is converted into commodities (C) which is transformed back into a larger quantity of money (M'). $M - C - M'$ thus describes the movement of self-valorizing value, value that is able to increase its own magnitude. Although the economic functions of buying and selling are the same as in the circulation of commodities, the purpose of the process is buying in order to sell. However, surplus-value is not gained from buying commodities cheap and selling them

1 The formula $C - C$ would represent barter or direct exchange of products with no value being equivocated between commodity A and B.

2 After the commodity has been bought, it falls out of circulation and into the sphere of consumption.

dear³. The increase in value comes from the consumption of a particular commodity that can create value. This commodity is, of course, labour-power. In order to explain how this self-valorization actually occurs, I will define and expand the formula of capital. By expanding the formula, we can fully appreciate how and why the commodity is a part of the circulation of capital, the first step to understanding how the commodity can accelerate.

The circuit of capital and its stages

The expanded formula of capital is $M - C (LP+MP) \dots P \dots C' - M'$, where C' and M' represent an increase in C and M as the result of the production process (P). LP and MP represent the respective commodities of labour-power and means of production. The dots indicate an interruption of the circulation process proper (Marx 1973:109). Because this expanded circulation form can be repeated infinitely, capital can be conceptualized as a circuit. As a circuit, capital

appears as a value that passes through a sequence of connected and mutually determined transformations, a series of metamorphoses that form so many phases or stages of a total process. Two of these phases belong to the circulation sphere, one to the sphere of production. In each of these phases the capital value is to be found in a different form, corresponding to a different and special function. Within this movement the value advanced not only maintains itself, but it grows, increases its magnitude. Finally, in the concluding stage, it returns to the same form in which it appeared at the outset of the total process (Marx 1978:132-133, emphasis added).

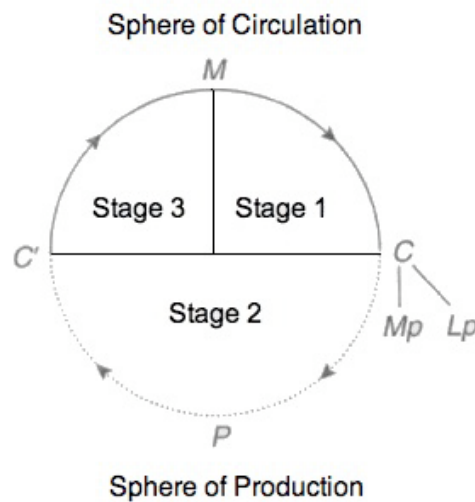
As a succession of stages and forms, capital must be understood as circulating capital, something that moves rather than an alienable thing (Marx 1978:185). Capital cannot be studied as something fixed or as constituted by analytically separate parts (Arthur 1998:95-96). In other words, capital is the totality of the stages of transformations that occurs in its circuit. At the same time, the circulation of capital is its

3 If this were the case, value would be distributed between buyers and sellers, but no new value would be produced (Marx 1976:262-266).

“becoming, its growth, its vital process” (Marx 1973:517).

The circuit of capital is represented in Figure 1. It shows the circuit's three stages: (1) purchase ($M - C (LP+MP)$); (2) production; and (3) sale ($C' - M'$). The first and third stages belong to the circulation sphere proper, while the second stage belongs to the sphere of production. The circuit of capital is therefore a dialectical contradiction of production and circulation. Figure 1 also represents the three particular forms of capital: money-capital (M), productive-capital (P) and commodity-capital (C'). These forms match specific functions that capital must fulfill in order to metamorphose into another form and complete its stages.

Figure 1: The circuit of capital



Adapted from Lebowitz (2006:61).

From the point of view of the circuit we can also see how both the commodity form (C) and the circulation of commodities ($C - M - C$) are incorporated into the overall circulation of capital. Marx measures the velocity of circulation in terms of the time capital takes to complete one circuit (a turnover). However, before considering how capital, and therefore all its forms, accelerates, I first take the necessary steps of

discussing the circulation process of capital, and the relationship between the universal form, i.e. the circuit, and the particular forms of capital.

Stage 1: The purchase ($M - C$) and the form of money-capital

The circuit of capital starts in the sphere of circulation, with the movement $M - C$ ($LP+MP$). In this stage the capitalist appears on the commodity and labour markets with value in money-form. In the form of money, capital must perform the money functions of means of payment and purchase. Money must be in a quantity sufficient to buy the elements of production. In order to complete this stage, the capitalist advances a quantity of value and transforms his money (M) into capital by purchasing the means of production (MP) and labour-power (LP) (Marx 1976:307-308; 1978:163-164).

In order for value to increase its own magnitude it must productively consume labour-power whose consumption is “an objectification of labour, hence a creation of value” (Marx 1976:270). The purchase of labour-power is therefore the “characteristic moment” and “essential condition” of the becoming of capital, because without incorporating labour-power into its life-process the value advanced in the form of money cannot “really be transformed into capital, into value producing surplus-value” (Marx 1978:113).⁴ Consequently, the circulation of capital relies on the existence of a class of people with no commodity to sell but their labour power, i.e. on capitalist relations of production.⁵

Surplus-value can be extracted from wage-labour whenever the worker works for longer than is necessary to reproduce the value of his labour-power which the capitalist advances as a wage. The labour performed over and above this necessary labour is surplus labour, which equals surplus-value.⁶ The sum of value invested in money form

4 “Money cannot become capital unless it is exchanged for labour-power, a commodity sold by the worker himself” (Marx 1976:1006)

5 The existence of capital relies on the creation of the so-called doubly free worker: doubly free in the sense that as a free individual the worker can dispose their labour-power as their own commodity, and that the worker has no other commodity for sale but their labour-power, or put another way, “is free of all the objects needed for the realization of his labour-power” (Marx 1976:272-73).

6 The extraction of surplus labour above necessary labour that constitutes the worker's exploitation, which is measured as the rate of surplus-value, which is surplus labour over the value of labour power (s/v), or

would “not be capital if it did not enrich itself with a surplus-value” (Marx 1978:404). The purchase of means of production is necessary to realize the value of labour power because the worker requires objects (raw material) to work on and instruments with which to work.

Although the capitalist transforms his money into capital by buying the commodities of LP and MP, the value advanced does not take the commodity form. Value briefly assumes the material forms of labour-power and means of production before they are set in motion as productive capital in the second stage of the circuit (see below). In the hands of the capitalist, LP and MP are respectively variable and constant capital. In the body of the worker, however, labour-power is simply a commodity, and when she exchanges it for a wage, the money she receives is just money, even though it was advanced by the capitalist as money-capital. In the hands of the worker, money is simply part of the circulation of commodities.⁷ The value advanced continues in the circuit when the M – C movement is completed (Marx 1976:317, 996; 1978:120-121).

Stage 2: Production (P) and productive-capital

At the end of the first stage the capitalist has brought together the subjective and objective conditions of production. As a result he now has the capacity to set a greater quantity of labour in motion than is needed to replace the capital-value advanced in the first stage. When constant and variable capital are set in motion, capital assumes the form of productive capital (P). In this form the capital value has achieved a “natural” form that cannot circulate any further, i.e. assume the money form. If the capitalist desires to valorize the value advanced, capital must assume its commodity guise before it can be converted back into money

The function of productive capital is therefore productive consumption of the material and value components of the elements of production in order to create a mass of

unpaid over paid labour. If a worker labours for 12 hours in a day and the value of labour-power equals 6 hours, the rate of surplus-value/exploitation is 100%.

7 The worker sells his labour-power as a commodity (C) and receives a wage in money form (M) and then uses the wage to buy other commodities (C).

qualitatively different commodities (C') that contain more value than the value advanced in the first stage. The commodity produced is not just any commodity, but “a commodity impregnated with surplus-value” (Marx 1978:109-112, 118-126, 132-136). As an immediate result of capitalist production, the commodity-form is integrated into the circulation of capital.

Stage 3: The sale ($C' - M'$) and commodity capital

In the third and final stage, the capitalist returns to the market, but this time as a seller of his newly produced commodities. Commodity capital (C') is the “functional form of existence of the already valorized capital value that has arisen directly from the production process itself” (Marx 1978:121). In the circulation of commodities, C' functions simply as a commodity with a specific use-value, e.g. yarn. In relation to the circuit of capital, however, C' has the social form of commodity capital. A commodity produced capitalistically does not simply have exchange value, but also has the specific use-value of objectifying surplus-value (Murray 1998:33).

In order for capital to be accumulated, surplus value must be realized, which can only be done by fulfilling the commodity’s function of being bought and sold (the $C' - M'$ movement). When the commodity is sold, capital metamorphoses back into money-capital. At this point the capital-value has returned to the form it had when originally cast into circulation and now exists in a form that can start the process anew, which means that circulation is not an isolated act, but a periodic process (Marx 1978:123-127, 235).

Capital is accumulated in the first stage of the circuit on the second turnover when all or part of the surplus-value is thrown back into circulation and used to buy the elements of production. While the first stage represented the becoming of capital, by completing the third stage the value advanced has become capital. In order to *be* capital, the value must return to its starting point and restart the circuit in a higher quantity than advanced in the first circuit. From the point of view of the entire circuit, the realized surplus-value (M') expresses both the purpose and result of capital (Marx 1978:130). I now turn to the relationship between the universal and particular forms of capital, the first

clue to understanding why capital has a need for speed.

Capital as the unity of the three forms

The circuit of capital is the universal form of capital; it comprises the whole within which the particular forms of capital are internally related. The identity of capital can thus be found in its unity and in the difference to itself as unity. This “negative unity” is found when capital exists in either of its stages or forms (Arthur 1998:102-116; Ollman 2003:59-86). Capital is found in two aspects: “first as the unity of the process, then as particular one of its phases, itself in *distinction* to itself as unity – not as two particular kinds of capital, not capital of two particular kinds, but rather as different *characteristic forms of the same capital*” (Marx 1973:622).

Capital is unified in the movement from its universal to particular forms. Marx refers to this process of assuming and discarding its particular forms as the “clothing” of capital (Marx 1978:109). As Arthur points out, this metaphor indicates the conceptual character of capital as something that cannot be immediately identified with any of its particular forms. Rather, it is a “unity, a process going on through their connection in a circuit of the *transformation* of capital” (Arthur 1998:102). It would be wrong to identify capital with its forms because that would “reduce an internally more complex value form (capital) to value forms proper to simple commodity circulation” (Arthur 1998:37). Capital is a qualitative process of transformation in which value appears in different forms and in the unity of these forms (Marx 1973:524). Only in its stages is capital

constituted as capital, and these forms of its movement are constituted as *its* forms only by virtue of the real unity of the circuit. If the circuit is broken down into its parts, into *disconnected* stages there is no longer any trace of capital; all that is left is simple circulation and the immediate process of production (Arthur 1998:107-108).

While the forms of money-, productive- and commodity-capital are necessary for the existence of capital, the particular forms are not in and for themselves capital. Outside the circuit they simply function as money, commodities and labour processes. Only in the

circuit do they also have the social function and forms of capital (Arthur 1998:107; Mattick 1998:22-23). Conversely, the properties and functions of money and commodities do not derive from their character as capital; the properties of productive capital cannot be derived from its existence in the means of production (Marx 1978:161).

Capital is not a “thing” that a capitalist can alienate, even though money and commodities in the hands of the capitalist are capital. Instead they are alienated as simple economic forms: commodity-capital is “alienated simply as commodity” and money-capital “simply as money, as the means of purchasing commodities” even if these commodities are the elements of production (Marx 1981:463-464). Capital in the form of money is not the result of the specific purchase of the elements of production or the function of money itself. Rather it is capital because it introduces the capitalist production process, a movement connected to the overall circuit of capital. Capital in the commodity-form always functions as a commodity to be bought and sold. It is commodity-capital because it objectifies the surplus-value that was created in the stage of production. The sale of the commodity that realizes its surplus-value is therefore “connected with the total movement of [a] particular sum of value as capital” (Marx 1981:463-464).

The three forms are only capital insofar as they are internally related to each other in the totality of the circuit and are the functional forms of circulating capital (Arthur 1998:102; Marx 1978:133). In other words, they are forms of capital because each form is the possibility of assuming the next form and completing and moving to the next stage of the circuit, and because of their specific functions in the overall circuit (Marx 1978:112). When capital is in negative unity, it is only potentially capital and perpetually becoming – it is capital if, and only if, it can discard its current form and metamorphose into the next form, which occurs only when the associated function is fulfilled. Money-capital is latently productive capital, which is the possibility of commodity capital, which in turn is the becoming of money-capital. Capital is therefore capital only at the moment when it is metamorphosing, at the particular moment when a specific function is fulfilled. Consequently, capital’s movement can only be observed between the various stages.

When in negative unity capital is not circulating, is not in movement, is therefore negated as capital and is stuck in a stage and in a simple economic form:

The passage from one moment to the other appears as a particular process, but each of these processes is the transition to the other. Capital is thus posited as value-in-process, which is capital in every moment. It is thus posited as circulating capital; in every moment capital, and circulating from one form to the next (1973:536).

I have now established that capital is in movement because it oscillates between being in unity and in negative unity. Here is also the first clue as to why capital must accelerate its circulation: it must try to avoid being in negative unity. Before I discuss the speed of capital, I first consider capital as a contradiction of production and circulation, because that dialectic shows how capital is devalued when it is negated in a particular aspect and because it leads into Marx's argument about barriers.

The dialectic of production and circulation

As Figure 1 shows (p. 14), capital is a totality of the spheres of production (stage 2) and circulation (stages 1 and 3). Capital can arise from neither production nor circulation alone, but is the “unity-in-process of production and circulation” (Marx 1973:620). During accumulation capital must constantly move between the two spheres (Harvey 2006:85). Although surplus-value is produced in the sphere of production, it is realized in stage 3 and capital is accumulated in stage 1 (Marx 1976:268; 1978:205). In capitalism, circulation “is just as necessary for commodity production as production itself” (Marx 1978:205).⁸ Because capitalism only recognizes consumption with money, capitalist production essentially produces for circulation (Marx 1973:90-94; 1981:525).⁹

⁸ In non-capitalist modes of production where use-value rather than exchange-value is the purpose of production, consumption is the necessary moment of production (Marx 1973:90-94). In chapter 3, I argue that digital piracy replaces circulation with consumption as the contradiction to production (pp. 97-98).

⁹ Theoretically, consumption itself is not necessary for capitalism to sustain itself; sale and purchase of commodities is sufficient. In reality, however, consumption must be satisfied. The commodity must be useful in order to be sold.

I have so far based my discussion on the circuit of money-capital, simply because this is how any capitalist would start and end his circuit. However, any particular form of capital can serve as point of departure and arrival, represented in Figure 1 as M, P and C'. I now briefly consider the circuit of productive-capital and commodity-capital.

The circuit of productive-capital (P) is thus $P \dots C' - M' - C (LP+MP) \dots P$ and the circuit of commodity-capital is $C' - M' - C (LP+MP) \dots P \dots C'$ (Marx 1973:144, 167).¹⁰ Taking Tc to stand for total circulation process, the formula of productive-capital can be written as $P \dots Tc \dots P$, and the formula of commodity-capital as $Tc \dots P \dots C'$. In these forms of the circuit, the realization of surplus-value appears as a precondition for production and vice-versa (Marx 1973:180). From the point of view of the circuits of productive- and commodity-capital, production and circulation of commodities mediate each other, i.e. they are dialectically related. It is clear from these forms of the circuit that not only is the commodity part of capital's shape shifting life process, but so is the circulation of commodities. In fact, the circulation of commodities appears as both the result and presupposition for capitalist production (Murray 1998:34, 44; Marx 1973:542-3).

What is interesting about the production/circulation-contradiction for the purposes of my investigation is that in the *Grundrisse* Marx, makes the strange argument that "capital [is] devalued from the completion of the production process until its retransformation into money and from there into capital again" (1973:519). Similarly, as long as a given capital-value "remains in the production process it is not capable of circulating; and it is virtually devalued. As long as it remains in circulation, it is not capable of producing, positing surplus-value, and engaging in the process as capital" (Marx 1973:621).

For the time capital stays in either the sphere of production or circulation, it is for all intents and purposes negated, just as it is when in negative unity: capital is circulating

¹⁰ Capital should be seen as the unity of the three forms of the circuit as each circuit is only a partial reflection of the totality of capital. As the unity of these three forms the formula would be $M - C (LP+MP) \dots P \dots C' - M' - C (LP+MP) \dots P \dots C'$. The real circuit of capital is not only a unity of circulation and production, but also a unity of the three forms of the circuit because it contains the moment of accumulation (Marx 1978:183).

capital and only exists when in movement. If capital is not constantly moving between its two spheres, it ceases to be capital, and all that remains are the simple forms M, P and C.

We can now begin to understand why increasing the speed of circulation is important to capital. If capital circulates faster, as it moves more rapidly from one sphere to the other, it spends less time being devalued. This argument is almost identical to the argument about the forms of capital I recounted above. If capital has stopped in either production or circulation, it is stuck in one of its forms.

The accidental reality of the circuit

Marx's conceptualization of capital as a circuit is nearly identical to Hegel's Concept because capital is a process that moves from universal to particular forms; in order for capital to be capital it must assume each of the forms and complete its associated stages (Arthur 1998). However, Marx turned Hegel on his feet: capital is *not* like the Concept. Marx denies that capital can automatically complete the circuit and he also denies it the fluidity and speed of thought of the Concept. For Marx it is never guaranteed that an individual capitalist will complete a turnover:

The three processes of which capital forms the unity are external; they are separate in time and space. As such, the transition from one into the other, i.e. their unity as regards the individual capitalists, is accidental. Despite their inner unity, they exist independently alongside one another, each as the presupposition of the other. Regarded broadly and as a whole, this inner unity must necessarily maintain itself to the extent that the whole of production rests on capital, and it must therefore realize all the necessary moments of its self-formation, and must contain the determinants necessary to make these moments real (Marx 1973:403).

Before I consider the relationship between temporal and spatial moments of the circuit and the concept of barriers, it is important to note that the first obstacle to capital's realization is that just like value, capital cannot appear by itself. Capital must "*invest itself in matter*, something that may in fact be resistant to it" (Arthur 1998:117). This is why capital "*risks* getting tied up for certain intervals," because it is never guaranteed

that capital will metamorphose into its next form (Arthur 1998:133). Although capital “lies fallow” and has a “barren existence” in each of its forms and stages, Marx argues that this is a necessary condition of capital as the unity of its forms (Marx 1973:621; 1978:133). As I will discuss later, capital can invest itself in binary code and the complementary matter of silicone and fibre optics. This investment carries high return, but is extremely risky; while digital code is less resistant to circulation it can also result in capital losing control over its movement, resulting in the digital piracy accident.

A given quantity of capital-value does not move in its entirety through the circuit one step at a time. Parts of the same capital-value will exist simultaneously in all the stages of the circuit.¹¹ If capital is delayed in its succession in the circuit, the coexistence of the circuit is brought into disarray, so that “every delay in one stage causes a greater or lesser delay in the entire circuit, not only that of the portion of the capital that is delayed, but also that of the entire individual capital” (Marx 1978:183). Conversely, if capital can accelerate in one stage, then the whole circuit accelerates provided the other stages function normally.

As long as capital is frozen in one of its forms and its phases have duration rather than being in fluid transition, capital is not circulating, but is in negative unity. Just as capital is devalued for the duration of its existence in the spheres of production and circulation, the negation of capital in a particular form is also the devaluing of capital in that form. When the flow of value stops, capital negates itself as value in process. As long as capital is idle it is negated, but as soon as the movement starts up again it is capital once more and is no longer devalued (Marx 1978:123-4, 153).

At this juncture it is important to note that the relative danger of capital being frozen in one of its forms is associated with the difficulty of fulfilling the associated

¹¹ Capital exists simultaneously in all the three stages of the circuit. Only 1/x of the capital value is active in production at any one time. When one part of the capital value departs from phase P, another returns. It is only when the total sum of the capital value advanced has been reproduced (i.e. accumulated by starting its second circuit) that the circuit has been completed (Marx 1973:660-61). Production appears as an interruption of circulation only conceptually, or when the entire capital value advanced moves mechanically from one stage to the next. In practice, “production time does not really appear interrupted by circulation time (...). But this is only because every capital is divided into parts, one part in the production phase, the other in the circulation phase” (Marx 1973:660).

function, i.e. the difficulty of transitioning to the next form (Marx 1973:544-47, 620-23). If the capitalist cannot find labour-power or means of production on the market, then his money becomes a hoard and loses its character as capital because it does not circulate. If capital comes to a halt or is tied up in the production phase, the means of production cease to function and labour-power remains unoccupied. This can occur if, for example, the means of production are held hostage by striking workers, or from lack of raw material. If capital halts in the third stage, its circular flow is stuck in the form of unsalable stock of commodities. This can happen for a variety of reasons, for example, long transport times to the market, or less demand due to competition or market saturation for a particular use-value (Marx 1973:621; 1978:133). In chapter 3 I will argue that digital piracy appears to capitalists as a loss of sales, which is the same as capital being stuck in the form of a stock of commodities.

Since the commodity has the social form of being the container of surplus-value in capitalist production, it is the most precarious form of capital simply because it must be confronted with money. In other words, the commodity is always initially devalued. As long as “the now valorized capital persists in the form of commodity capital, is tied upon the market, the production process stands still. The capital operates neither to fashion products nor to form value” (Marx 1978:123-4). If less than the entire stock of commodities are sold or not sold at all, less or no surplus-value is realized, which in turn will affect how much capital can be accumulated. The value contained in the commodity simply disappears if the commodity is not sold. The precarity of the commodity form is compounded by the fact that the sale is the most difficult stage to complete.

In money form, however, value can last much longer than in the commodity form. Money is the universal equivalent, and as such can purchase any other commodity, be invested as credit, be used for individual consumption, or be advanced as capital when the elements of production can be found on the market. Because money is very mobile it can be advanced as capital almost anywhere it can find markets for credit or the elements of production (Marx 1973:404; 1978:154).

Based on my discussion of the inter-relationship of circulating capital's forms,

stages and spheres, I will now consider why and how capital accelerates. It should come as no surprise that because capital is negated and devalued for the time it stays in a particular form, stage and sphere, capital's imperative is to always be in movement. By increasing the velocity of its metamorphoses, capital spends less time being devalued; “The constant continuity of the process, the unobstructed and fluid transition of value from one form into the other, or from one phase of the process into the next, appears as a fundamental condition for production based on capital” (Marx 1973:535).

Nicholas Garnham argues that capitalism, indeed any economic system, is an economy of time (1990:45-53). Capitalists are obsessed with other people's (labour) time because it is the source of value, and while a capitalist desires to extract as much labour time as possible, he wants to do this in as little time as possible. By increasing the velocity of capital, he can reduce the time capital is devalued.

Just as value is measured in labour-time, the devaluation of value can be measured in the duration of a particular stage. The time it takes for a given capital value advanced in a particular form to return to the same form comprises capital's overall circulation time or turnover time (Marx 1978:200, 236). Turnover time is thus the sum of production and circulation time, which can be further divided into buying and selling time, i.e. the duration of the first and third stages of the circuit.

If the dialectic of production and circulation is expressed temporally, then circulation is a deduction from production time, i.e. the time during which value is created (Marx 1973:538, 548). If circulation time is extended there will be a contraction of the production process, and if circulation time is reduced production can expand (Marx 1978:359). The frequency with which the same capital value can repeat the production process and create new value is thus determined by circulation time (Marx 1973:538, 548; 1978:359). Before I consider this argument in detail I introduce the concept of barriers, which is intimately related to why the inner unity of capital is accidental in reality and why circulation time is of longer or shorter duration.

Barriers

Capital posits barriers in contradiction to its tendency to function freely and expand boundlessly, delaying the transition of capital from one form and phase to the next (Marx 1973:421, 538). Because capital proceeds in space and time, the barriers are external to capital; they do not arise from the production process itself. In the *Grundrisse*, Marx considers necessary labour, consumption/use-value,¹² space and circulation time as barriers. We will mainly deal with the barriers of use-value, space and circulation time as these directly relate to the velocity of circulation of capital.

According to Antonio Negri, capital tries to overcome barriers, at least temporarily, in order to “release its own potency” (1984:115, 114-119). Overcoming barriers, however, are just temporary measures and merely constitute an “endless re-positing of the obstacle” (Negri 1984:116). While capital can ideally get beyond its barriers, it does not by any means follow that it really has overcome them. Instead, capital keeps re-producing its own barriers, making them more difficult to overcome as one barrier folds into the next:

[F]rom the fact that capital posits every such limit as a barrier and hence gets ideally beyond it, it does not by any means follow that it has really overcome it, and, since, every such barrier contradicts its character, its production moves in contractions which are constantly overcome but just as constantly posited (Marx, 1973:410).

The circulation of capital proceeds in space and time. The stages of the circulation of capital are accomplished successively in time and in different geographical locations. I will revisit this important aspect of circulation in the following chapters with respect to the compression of the spatial and temporal moments of circulation by the absolute speed of light of telecommunications, which allows for production, circulation and even, in the case of streaming, consumption to occur simultaneously. The spatial aspect is directly related to the transportation of commodities from the point of production to the market

12 “[A]s use-value, the product contains a barrier – precisely the barrier consisting of the need for it – which, however is measured not by the need of the producers but by the total need of all those engaged in exchange” (1973:405).

because, in order to be exchanged, commodities may require a change of location.¹³ The circulation of commodities takes place in space (real circulation), which conditions the formal circulation of the forms of capital (Marx 1973:535; 1976:178; 1978:200-6, 226).

The first barrier to capital is found in the use-value of the commodity. In effect, the social need for a use-value limits exchange (Marx 1973:405). Production of use-values must therefore be limited to a specific quantity, which is not related to the labour objectified in them but to the mass of use-values produced (Marx 1973:404-6). If too many commodities are produced and cannot be sold, the value objectified in them vanishes. Capital can use different contrivances to overcome this barrier and lubricate the moment of exchange. For example, planned obsolescence, or, because capitalism only recognizes consumption with money, the extension of consumer credit. In the narrative Marx presents in the *Grundrisse* capital overcomes the barrier of use-value by extending itself in space.

An expanded market and spatial orbit of capital makes it easier to sell commodities produced in larger and larger quantities. By extending itself in space, however, capital becomes frozen in the commodity for the time it takes to reach the market, thus also extending purchasing time because capital in money form must be repatriated to the capitalist (Marx 1973:534, 542; 1978:200-206). Space is thus also a barrier to production based on capital. Capital's attempt to overcome the barrier of use-value merely reposit that barrier as a spatial barrier.

Capital is inherently global as it strives to make the whole earth the market for its commodities (Marx 1973:539; Marx and Engels 1998:39-40). At the same time capital strives to "annihilate this space with time, i.e. to reduce to a minimum time spent in motion from one place to another" (Marx 1973:539). The annihilation of space by time is the same as abbreviating the circulation time of capital, which is mainly done with the development of "the physical conditions of exchange": circulation infrastructure and the means of communication and transport. David Harvey (2006:373-412; 1996) argues that

¹³ The spatial condition is not a necessary moment of circulation because a product may be bought and consumed at the point of its production. A commodity does not have to move in space to circulate. For example, a house can circulate as a commodity but does not circulate in space.

it takes a very specific organization of space, a physical adaption of the geography of the earth, in order to annihilate it with time and facilitate rapid turnover times and ever shorter circulation times. His argument can be understood as capital inscribing itself onto the surface of the earth through roads and railways, the seaports, airports, teleports, and cities that facilitate trains, planes and automobiles, and digital data. The wider the spatial orbit of capital, the wider capital's geographical extension, the greater the annihilation of space by time is required, which in turn leads capital to edit what it writes on the surface of the earth.

The speed at which commodities can be transported reduces absolutely the period in which they migrate and also abolishes distance relatively (Marx 1978:327). For example, a remote location with a railway connection is closer in time than a city in proximity to the point of production but without a railroad connection. The speed and acceleration of the vehicles of communication and transport directly reduce spatial distance to time (Marx 1978:327). In the coming chapters, I investigate how telecommunications and digitization reduce absolutely the distance commodities have to travel and the time they spend in circulation.

That space is annihilated by time means that spatial distance is reduced to temporal distance; spatial extension folds into circulation time. Circulation time is, however, also a barrier to capital. When space is reduced to time, the spatial barrier is re-posed as a temporal barrier in circulation time. While circulation is as necessary to production itself, circulation is nevertheless a barrier to the self-valorization process of capital. Marx writes:

Circulation time in itself is not a *productive force* of capital, but a barrier to this productive force arising from its nature as exchange value. The passage through the various phases of circulation here appears as a barrier to production, a barrier posited by the specific nature of capital itself. All that can happen through the acceleration and abbreviation of circulation time – of the circulation process – is the reduction of the barrier posited by the nature of capital (1973:545).

Circulation time is a barrier to production because the production process is able to start over again only when capital has gone through the stages and metamorphoses in the sphere of circulation. The number of times the production process can be repeated is thus a direct function of the velocity of circulation; the higher the velocity of circulation, the more often the production process can be repeated. The maximum number of repetitions occurs when the velocity of circulation is absolute, that is when circulation does not interrupt production and turnover time is equal to production time. Since turnover time equals production time plus circulation time, the velocity of circulation is measured in circulation time. Absolute velocity is therefore a circulation time of zero. In other words, at absolute velocity capital can restart the production process as soon as the previous process is completed; from the point of the overall circulation of capital, value production is at its maximum (Marx 1973:538-45, 627).¹⁴

In essence, increasing the velocity of circulation is the same as speeding up the transformation of capital because “[t]he more that the circulation metamorphoses of capital are only ideal, i.e. the closer circulation time comes to zero, the more capital functions, and the greater is its productivity and self-valorization” (Marx 1978:203).

Capital tries to overcome the barrier of circulation time through increasing the speed of capital's metamorphoses in the sphere of circulation. Capital's metamorphoses constitute sections of circulation that have their own durations. As we will see towards the end of this chapter, it must take time – even just the blink of an eye – to metamorphose and complete the various stages.

Selling time is the most decisive moment of circulation time because the sale realizes the surplus-value objectified in the commodity. It is more important than the purchase, or first stage of circulation, even though both the sale and purchase are equally necessary for the circulation of capital. The sale is also the most difficult part of capital's metamorphosis and forms the greater part of circulation time, because selling time is particularly influenced by the spatial condition of circulation and by the social barrier of

¹⁴ From the point of view of the sphere of production, however, value creation is determined by the working day and the intensity and productivity of the labour process (Marx 1976:283-639).

use-value (i.e. competition from other businesses and consumer discretionary spending). While capital strives to shorten time spent in circulation in general, it is particularly important for capital to shorten the moment of exchange (Marx 1978:205, 326).

Although selling time can be zero if the commodity is shipped to order and paid for on delivery (Marx 1978:329), the time capital is frozen in the commodity form will still have duration as commodities need to be transported. As mentioned above, the main contrivance of capital to shorten circulation time and therefore also selling time is to organize space and develop the means of communication and transport. The ability of capital to be transported or transmitted, however, depends on the economic and material form that capital takes.

Capital in the form of money as credit is the most mobile of all because it can be transmitted as information and the only limitation to its motion is bandwidth and processing speed. The mobility of commodity capital depends on the means of communication and the natural qualities of the commodity, such as weight, size, fragility and perishability. When commodity-capital invests itself in digital code, that is when use-values are digitized, it acquires characteristics very similar to electronic money and credit that allows it to move and proliferate at the speed of electromagnetic waves (Harvey 2006:376-386).¹⁵

While reduction of time spent in transportation is the most important way to reduce overall circulation time, capitalists can use various contrivances¹⁶ to speed up the various metamorphoses of capital. In stage 1 they include

- electronic banking;
- just-time production (JIT);
- business credit.

In stage 2, they include

¹⁵ Productive capital is the least mobile form of capital. Materially, productive capital is a labour process and includes the organization of labour as well as the means and instruments of production. However, even productive-capital can be digitized, transforming the labour into tele-labour and “crowdsourcing”. (pp. 63-64, 82-83).

¹⁶ For reasons I will discuss in the afterword, I consider these contrivances to be capitalist media.

- intensification (e.g. Taylorism);
- JIT;
- automation;
- robotization;
- small-batch production.

In stage 3, they include

- advertising;
- consumer credit;
- packaging;
- disposable/ ephemeral goods;
- planned obsolescence;
- fashions;
- instant products (e.g. fast food);
- just-in-time (JIT) production.

In addition, information and communication technologies can be used to co-ordinate the overall circuit (Fuchs 2009a; Smith 1998; Harvey 1989:229, 285; Marx 1973; 1978).¹⁷

There are several benefits for capital to accelerate its metamorphoses. First, the sum of values produced in a given time is determined by the new value created in the production process multiplied by how often this process can be repeated within a given period of time. If more circuits can be completed within a given period, more capital can be accumulated within that period. With more value in money form, the capitalist can buy more workers and set their labour in motion with the value they produced in a previous circuit. Second, the absolute mass of use-values will also increase if more cycles of production are repeated within a given period. Third, the rate of profit and surplus-value is increased by speed through the reduction of costs of circulation (Marx 1973:518;

¹⁷ In the *Grundrisse*, credit appears to be a privileged, albeit artificial, contrivance because it can keep individual circuits going artificially, i.e. a circuit can be restarted before the original value has turned over (see e.g. Marx 1973:542-549). By taking up a loan a capitalist can restart the production process before the original capital value and the surplus-value contained in the commodity has been realized (Marx 1973:542). In *Capital Vol. 3*, Marx discusses credit as having the purpose of “acceleration... of the individual phases of circulation or commodity metamorphosis, then an acceleration of the metamorphosis of capital and hence an acceleration of the reproduction process in general” (1981:567). Although credit pertains to the acceleration of the circuit, it is beyond the purpose and scope of this thesis.

1978:124, 389; Harvey, 2006:85-87; 1989:229; Dyer-Witheford, 1999:116, 202) Fourth, in a given period, a quantity of capital with a high velocity of circulation may create more surplus-value than a larger quantity of capital with a low velocity of circulation (Marx 1973:518-519).¹⁸ For the same reason, it is beneficial for individual capitalists to reduce their turnover in relation to the social average turnover time (Harvey 1989:229).

In the sphere of production, accelerating the production process yields a greater mass of surplus-value and a higher rate of relative surplus value. Another benefit of acceleration, for example Taylorism and automation, is that it may discipline the workforce.

From barriers to absolute limit

It is clear that the acceleration of capital is essentially the acceleration of capital's metamorphoses and its movement between the spheres of production and circulation. The faster capital assumes and discards its forms, and the less time it spends devalued and negated in a particular form, the more capital is capital, and the more it can enrich itself with surplus labour. Its acceleration, however, has limits.

Barriers are not endlessly repositied. In the end, a barrier becomes insurmountable and is posited as an absolute limit to capital's expansion and functioning. Negri argues that barriers are “defined, at first, at the level of circulation, but in the last and decisive instance redefined and actively reconfigured on the terrain of production” (1984:117). Further, he sees the final limit of capital as the possible elimination of necessary labour,

18 “If a capital – say originally of 100 thalers – turns over 4 times in one year; let the gain be 5% of itself each time, if the value is not capitalized; this is the same as if a capital 4 times as large, say 400, at the same percentage, were to turn over *once* in one year; each time 20%. The velocity of turnover therefore – the remaining conditions of production being held constant – substitutes for the volume of capital. Or, if a value 4 times smaller realizes itself as capital 4 times in the same period in which a 4 times greater value realizes itself as capital only, then the smaller capital's gain – production of surplus-value – is at least as great as the larger's. We say at least. It can be greater, because the surplus-value can itself again be employed as surplus capital. For example, assume that a capital of 100 has a profit (...) of 10% each time, no matter how often it turns over. Then at the end of the first 3 months it would be 110, at the end of the second 121, at the end of the third 133 1/10, and at the end of the last turnover 146 41/100, while a capital of 400 with one annual turnover would be only 440. In the first case the gain = 46 41/100, in the second only 40” (Marx 1973:518-519). See also Marx (1973:630).

which Marx suggests in the “Fragment on Machines” (1973:690-712).¹⁹ Necessary labour thus forms the final insurmountable limit that capital cannot overcome without leading to its dissolution. However, because capital is a contradiction of production and circulation, an absolute limit to capital can also be found in the sphere of circulation. If capital were to finally overcome its circulation barrier it could simply be re-posed in production, because eliminating the barrier would also eliminate the possibility of capital realizing its value through exchange and consequently accumulation. In the final instance, circulation time as well as necessary labour pose as absolute limits to capital.

Because capital functions more efficiently the closer circulation time comes to zero, Marx argues that it is the “necessary tendency of capital to strive to equate circulation time to 0; i.e. to suspend itself, since it is capital itself alone which posits circulation time as a determinant moment of production time” (Marx 1973:629). Capital strives to spend as little time as possible in its various stages by fulfilling the functions of its particular forms. However,

time must pass between the different metamorphoses through which capital must travel; its circulation time *must* appear as a deduction from its production time... the nature of capital [as exchange value] presupposes that it travels through the different phases of circulation not as it does in the mind, where one concept turns into the other at the speed of thought, in no time, but rather as situations which are separate in time. It must spend time as a cocoon before it can take off as a butterfly (Marx 1973:548-49).

Marx is here arguing that circulation has a speed limit, which is conditioned by the fact that capital cannot be capital unless it assumes its necessary forms in turn. If capital travels too fast it cannot assume the commodity form and perform its essential function of being sold and thus realize the surplus-value objectified in it. This is exactly what occurs with digital piracy. Dyer-Witheford argues that in the technological context of telecommunications, capital does not pass through the commodity cocoon. When

¹⁹ In the “Fragment on Machines”, Marx (1973:690-712) argues that capital will abolish itself when the dead labour of machines replaces living labour because it is only living human labour that can create new value. Incidentally, Negri's argument can be understood in terms of the speed of the production process as the creation of relative surplus-value is the elimination of necessary to surplus labour through intensification, machinery and automation.

commodities can be converted into a natural form of 0s and 1s, they can be transmitted as electromagnetic waves at the speed of light. Products of labour, such as an Mp3 or a digitized movie, are “instant butterflies” that flutter directly into the sphere of consumption (1999:202). Capitalists lose control of the moment of exchange due to the speed with which their capital circulates. The commodity form disintegrates because it cannot be sold, and the sphere of circulation is suspended, which is nothing but disastrous for capitalism.

While Marx argues that although the tendency of capital is to eliminate circulation time, he also argues that the actual elimination of circulation time would be “the same as to suspend the necessity of exchange, of money, and of the division of labour resting on them, hence capital itself” (1973:629). Marx is referring to the end of social capital, or capital as such. The quote can, however, refer to individual businesses or branches of production. In the context of digital piracy, I take it to refer to the possible end of those branches of production that have digitized commodities. In contemporary capitalism, those branches are mainly the entertainment industries (publishing, music, movie, TV and software/games industries), but in the future, more branches of production may be affected, especially as 3D printers become more advanced and ubiquitous consumer commodities.²⁰

According to Marx, the absolute limit of the velocity of circulation is reached when circulation time is zero (1973:544). Because circulation time is the measure of the speed with which capital circulates, the limit of circulation time can be thought of as a speed limit for capital. Capital can go fast, but it cannot reach absolute velocity; it must have a circulation time greater than zero.

Marx's argument is unsatisfactory because he does not specify how capital can reach absolute velocity, or whether reaching it is even possible. In the *Grundrisse* the “butterfly fragment” reads as if Marx were simply taking his argument about the temporality and velocity of circulation to its logical extreme. In *Capital Vol. 2*, Marx does not mention butterflies, instant or otherwise, and argues that while capital strives toward

²⁰ In chapter 2 (pp. 61-64), I discuss 3D printing in detail.

zero circulation time it cannot actually reach this ideal. It is likely that Marx did not write about butterflies in the more scientific second volume of *Capital* because he could not find evidence of their existence. However, I argue that capital can achieve absolute velocity if it relies on computers, telecommunications and digitization. In this technological context, digital piracy is the evidence for capital being able to achieve absolute velocity and that instant butterflies actually exist.

Since Marx could not have envisioned the integrated circuit, fibre-optics or the absolute speed of telecommunications, I now turn to Paul Virilio because he does consider these technologies and analyses them using his theory of speed. In the following chapter I bring Marx up to the absolute speed of light and into real time. This is a necessary step to my argument that digital piracy is an accident of value that occurs when capital crashes into the wall of real time.

Chapter 2: From real space to real time

Everything right now! Such is the crazy catch-cry of hypermodern times, of this hypercentre of temporal compression where everything crashes together, telescoping endlessly under the fearful pressure of telecommunications (Virilio, 2007:100).

The circulation of capital proceeds in and is conditioned by space and time. In Virilian terms, circulation occurs in and is structured by extensive time and the real space of geography. The purpose of this chapter is to set the stage for my central argument that digital piracy is an accident of value that occurs when capital crashes into the wall of real time. I introduce and discuss Virilio's conceptualization of real time and its effects, and consider how he defines real space and how speed becomes a technological and compulsive force that must accelerate up to the absolute speed of light. After introducing the specific temporality and spatiality of real time, I introduce the concept of generalized arrival and Virilio's argument about the accident. The discussion in this chapter will enable me to analyze the process of the circulation of capital in the light of real time in the following chapter. I begin with some general remarks on Virilio's theory of speed and acceleration.

Virilio and the compulsive logic of speed

According to Virilio, speed is the principal structuring principle of social organization and the cause of historical change. His dromology – the science of the logic of speed – studies the nature of speed, its emergence, transformation and effects. He does not consider speed to be a phenomenon, but rather the relationship between phenomena, particularly between space and time. Changes in speed alter the space-time relation, which in turn conditions historical and social change and how we perceive and interpret reality (Virilio 1977; 1991; 1995; 1997).

In Virilio's narrative, the progressive and compulsive acceleration towards the absolute limit speed of light gradually eliminates the real space of geography and ends with the substitution of reality by the virtual reality of the real time of telecommunications. He sees war and weapons systems as the vanguard of acceleration because control of territory, arguably the *raison d'être* of the military, is “not primarily about laws and contracts, but first and foremost a matter of movement and circulation” (Virilio and Armitage 2000: Virilio 1977). War is a logistical enterprise based on speed because whoever possesses the fastest weapons systems gains control of territory. Having the greatest possible speed at one's disposal therefore equals power; the quick dominate the slow (Virilio 1977). Consequently, improvements in weapons systems – from horsemen to guns, artillery, tanks, planes, satellites, etc. – are nothing but an arms race of mutually assured acceleration, which in turn drives social and historical change. Virilio's theorization of speed leads him to argue that the power and wealth of the ruling class come from their possession of greater speed, not to their relationship to the means of production. On this level Virilio cannot be reconciled with Marx; doing so would impoverish either the former or the latter. However, the remainder of this chapter and the next will demonstrate that Virilio's conceptualization of acceleration up the absolute speed of real time and its effect on real space is very helpful to update Marx's analysis of the process of circulation to the contemporary context of digital computer networks.

Metabolic speed and real space¹

Prior to the industrial revolution, i.e. for the greater part of human history, speed was limited by the metabolic human and animal body and by the speed provided by nature (for example, wind for sailing ships and windmills). The maximum speed of the metabolic body is relatively low and is consequently easy to control and manage. In terms of acceleration, the metabolic body is a brake on speed and, considering that acceleration is the source of historical and social change, metabolic societies are

1 My exposition of the shift from metabolic to technological speed is influenced by Stefan Breuer's (2009) essay “The Nihilism of Speed: On the Work of Paul Virilio”.

characterized by stability and continuity (Breuer 2009:216-217; Virilio and Lotringer 2008:44-45, 140).

Metabolic societies represent an “age of breaks” that corresponds to a primacy of a particular space that Virilio refers to as “geographical” or “real space.” Real space is first and foremost substantial and material; it possesses volume, mass, density, gravity, weight and extension. These characteristics condition how in real space matter is physically displaced and the speed with which it is transported. Real space is the order of co-existence because it “keeps everything from occupying the same place” (Virilio 1991:17). Everything and everyone therefore have unique locations in space. Real space thus divides and separates rather than connects (Breuer 2009:217; Virilio 1991; 1997).

Real space corresponds to a particular form of time: the extensive, historical time of *longue durée* (Virilio and Lotringer 2008:98). In real space, time has duration and can be divided into past, present and future. Extensive time is “time that passes;” because it has duration and is organized, it guarantees stability. Extensive time is dependent on the extension of space and can be understood as a dependent variable of space. Their relationship is linear; as distance-space increases, distance-time must increase correspondingly assuming that speed is constant (Breuer 2009:217-218).

Anything that takes place or is located in real space, is structured according to the intervals of duration (time) and extension (space). In Leibnizian terms, time is the order of succession and space the order of co-existence (Crang 2007:69). Events and actions occur at specific moments in time, have a given duration and can be located in specific geographical locations. In essence, everything has its “here and now” (Virilio 2007:26-29). For example, the circulation of capital and commodities that Marx analyzed in the *Grundrisse* and in *Das Kapital* belong to this real space of physical displacement because it “proceeds in space and time” (1973:533). Circulation can be interpreted according to the intervals of real space because it has duration (circulation/ turnover time) and extension (spatial orbit/ the world market), and the points of production and exchange have precise geographical locations separated by an interval (distance) of space.

The dromocratic revolution and technological speed

The “age of breaks” ends with the dromocratic revolution, when technological speed overcomes metabolic speed. According to Virilio this event is more significant than the industrial revolution in production² because it introduces the “age of acceleration.” He claims that “there is no industrial revolution, only a dromocratic revolution” that introduces *dromocracy* (1977:46; Virilio and Lotringer 2008:140, 45; Breuer 2009:223). Dromocracy is the fusion of power and speed that brings forth the means and capacity to “produce *artificial* speed that overcomes the possibilities of human and animal body many times over” (Breuer 2009:233).

While the dromocratic revolution is introduced with the invention of the steam engine, dromocracy is a condition of progressive acceleration: technological speed increases with the invention of other engines, such as the internal combustion engine, the electrical engine, the jet engine and finally the rocket that can reach escape velocity and break free from the gravity of real space.

Technological speed initially produces relative gains in velocity with the purpose of transporting commodities and people (soldiers and/or workers) as fast as possible from one place to another, for example, the relative gain in speed of a locomotive over a horse-drawn carriage. Moreover, acceleration of transportation can be only relative because what is displaced across the surface of the earth is matter, which is conditioned by gravity and (to a lesser extent) the density of real space. The upper limit of relative speed is escape velocity (11.2 km/s); if matter achieves this speed it will leave the surface of the earth and enter into its orbit. Escape velocity is thus the limit speed of real space and is a barrier to acceleration as such until the revolution in microphysical transmissions, which enables acceleration up to the limit speed of light (300,000 km/s) (Virilio 1997:31; 1999:27, 42).

2 Marx’s chapter on machinery in *Capital Vol. 1* has some resemblance to Virilio’s argument about the dromocratic revolution. For Marx, however, the replacement of metabolic with technological speed introduces the factory system, which “makes its appearance as soon as human muscles are replaced, for the purpose of driving the machines, by a mechanical motive power, such as steam or water” (Marx 1976:589).

The dromocratic revolution does not merely introduce technological speed, but unleashes speed as an independent force. According to Virilio, speed follows a compulsive logic of increasing acceleration and seeks to push beyond all barriers and obstacles until the cosmological limit speed of light is reached. Speed acquires its independence at the expense of humanity's control over it (i.e. speed is latently beyond control); progressive acceleration equals a corresponding, though always only a potential, loss of control. If control over speed is actually lost, an accident occurs. The higher the speed, the larger the impact and reach of the accident.

In metabolic societies loss of control of speed is not a big problem considering that speed is limited in these societies. Nevertheless, accidents do occur, but they are small and local affairs, such as a person thrown from a horse or the sailing ship that sinks after being caught in the speed of a storm. When speed becomes an independent force, however, the possibility of accidents is greater because Virilio argues that the natural human body is not equipped to comprehend, interpret or respond to phenomena that occur at ever increasing technological speeds.³ A mundane example of loss of control at technological speed is the high-speed car crash, when the driver simply loses control over the internal combustion engine and the car-space of her body. With the car wreck the accident is local and has minor effects, beyond the tragic loss of life and/or limbs. The situation changes, however, when speed is absolute and the accident is no longer local in space, but global in time.

Virilio illustrates his argument by the example of diminishing reaction times to missile launches. Wars fought with missiles, traveling at supersonic speeds are no longer about space, but time. A case in point is the Cuban missile crisis. In 1962, the two superpowers had fifteen minutes of reaction time were one of them to launch a nuclear missile attack at the other. If the Soviet Union has missiles on Cuba, however, the USA's reaction time would be reduced to approximately thirty seconds. Virilio argues that this

3 In other words, speed can be thought of as a subject, similar to Marx's capital/value subject, which works behind the backs of people and acts through living and dead representatives. Virilio's argument that "history only progresses at the speed of its weapons system" (1977:90) can certainly be interpreted in this way because possessing greater speed grants territorial control.

was unacceptable to the USA because a human mind would not be able to react and make a decision to retaliate in such a short time (Virilio 1977:155). This argument is phenomenological: the human mind simply cannot comprehend intensive time that has little (or no) duration (Virilio 1990:45). Only the speed of a microprocessor can cope with time that so intensive that it must be measured in fractions of a second. Virilio's argument is that we have completely lost control over speed; when such vital decisions are automated: "response time is now so short that, in a moment of international crisis, war and peace are decided by computer" (Virilio 2000b:95). The loss of control in this case could result in a global or integral accident with apocalyptic overtones.⁴

The reason I have introduced the argument about speed as an independent force and have prefigured part of the accident argument is twofold. First, capital can lose control over its own circulation when it is mediated by the absolute speed of telecommunications; anyone in possession of a digital device and an internet connection has the speed of electromagnetic at their disposal and can use it to divert use-values away from the circuit of capital. Second, digital piracy can be conceived as an accident of value because of capital's loss of control. While this accident was local when computers were isolated, bandwidth was low and copying of music, movies and computer games required physical proximity, the accident of value becomes global and threatens the integrity of the circuit of capital when computers start to write each other through fiber optic cables and the radio spectrum.

With acceleration, the real space of geography can be overcome and conquered. This process is identical to Marx's "annihilation of space with time", i.e. annihilation of space (and of time, Virilio would argue) with speed. Real space, however, is not annihilated by acceleration and its technological representatives alone. Compulsive speed demands that the surface of the earth be modified and organized according to its logic: obstacles cannot be avoided, they must be eliminated! The surface of the earth is literally

4 Virilio makes a similar argument about the loss of control to speed in relation to meltdowns at nuclear power plants. He writes: "In a nuclear power plant, safety depends on time gained against the ultimate accident: French engineers explain, for example, that their nuclear power plants' cooling systems have been modified to give their operators a *few minutes* at the control before a catastrophe occurs, enough time for a reflex action to slow down or cool down the reactor" (1993:216-217).

flattened; it is cleared of anything standing in the way of speed (Virilio 1997:84; 2007:88-89).

Through the development of large “static vehicles” of material infrastructure, such as highways, railroads, tunnels and bridges, territories are made more dynamic, i.e. more amenable to higher transportation speeds. The static vehicles promote the acceleration of small “dynamic vehicles,” such as planes, trains and automobiles, which facilitate increased and rapid transportation of people and commodities (Virilio 1997:79-81; 2007:83-89).

Virilio’s narrative about the flattening the surface of the earth according to the logic of speed is almost a re-visiting of David Harvey’s argument that annihilating space with time requires a very specific organization of space (pp. 27-28). When it comes to the physical alteration of the geography of the earth, the logic of speed meets the logic of capital, their difference being that capital inscribes and speed levels. The effect is nevertheless the same: geographical space is eliminated and boundaries between places are diminished. The physical transportation of people through highways, railways, and rapid vehicles such as the TGV⁵ or jet aircraft compresses real space so that, for example, “Paris [turns] into a neighborhood of Valence and makes New York the great suburb of the Ile de France” (Virilio 1991:55).

Compulsive speed, however, can never be satisfied. The real space of geography is “[n]ever smooth enough, never *desertified* enough, the solid element of the earth’s surface seems... too restricting for transport acceleration” (Virilio 1997:81). The “lay of the land” presents countless brakes to movement and acceleration in the form of different altitudes, trees, mountains and people. Dynamic transportation vehicles are moved underground, onto water and in the air to bypass the physical barriers to acceleration that cannot simply be eliminated. The sea and air, in particular, can accommodate high speeds of dynamic vehicles because they are “field[s] of organization independent of static arrangements, in which fast, linear movements in the form of vectors are possible” (Breuer 2009:224).

5 *Train à Grande Vitesse* (high-speed train).

However, even air, wind water, and waves are obstacles to acceleration simply because they are conditioned by the density, mass and gravity of real space. Ultimately, the geography of real space itself is a speed bump; even matter is an obstacle to further acceleration. Stefan Breuer thus argues that Virilio's speed is, in essence, nihilistic as it requires not only "the absence of obstacles, but rather the absence of matter as such; its ideal space is... a vacuum" (Breuer 2009:232, see also Virilio 2005:141). In its nihilistic drive, speed tries to modify the real space of the earth according to the vacuum ideal (because it is only in vacuum that light can travel at absolute speed), resulting in the "defeat of the world as field, as distance, as matter" (Virilio 1977:150). It is only by exterminating matter that speed can accelerate further, to get as close as possible to its ideal of light. According to Virilio, this extermination of matter occurs with the revolution in transmissions (Virilio 2007:49-50; 1997:84).

The revolution in transmissions and real time

The transition from relative to absolute acceleration can help explain how circulation time can actually be suspended. Marx suggested that circulation is suspended when the velocity of circulation is absolute, measured as circulation time of zero. I posit circulation time as an absolute limit to production based on capital and suggest that this limit could be identical to the cosmological constant and insuperable limit of the absolute speed of light. In what follows I explain the effects of the real time of absolute speed on real space and extensive time. This will serve as a conceptual bridge that will allow me to argue in the next chapter that absolute velocity is indeed linked to the absolute speed of telecommunications, and that digital piracy is therefore an effect, more precisely an accident of value, of capital crashing into the wall of real time.

The transition to absolute acceleration and the second revolution in technological speed occurred with the revolution in microphysical transmissions, starting with broadcast radio and television and continuing today with micro-electronics and

telecommunications (Virilio 1999:42).⁶ In contrast to relative gains in velocity, the revolution in transmissions is concerned with absolute acceleration up to the limit speed of light.⁷ The revolution in transmission ushers in real time, which is a “hypercentre of temporal compression where everything crashes together” (Virilio 2007:100). The “everything” Virilio refers to is all that was ordered according to the intervals of real space, which now crashes together into real time’s wall of “everything right now!”^{8 9}

Real time cannot be understood in terms of the real-space intervals of duration and extension; it is necessary to conceptualize the “distance” and “duration” of presence and action mediated by telecommunications with a third interval. Virilio introduces the interval of light (limit speed) because tele-presence and tele-action can only be explained in terms of the speed with which they occur; at absolute speed events are exposed to the light of the speed of light (Virilio 1997:3, 13). Real time has no extension and duration, it occurs at the limit-speed of light.

The geographical foundations of real space are “replaced by a tele-foundation of the global real-time communication system” (Virilio 2000a:9). In this organization of real space, the heavy material infrastructure of transportation that facilitated the speed of

6 It is interesting to note that this argument sets Virilio apart from other media theorists (e.g. McLuhan) because he does not consider the telegraph as the representative technology of the transmission revolution. The reason for this might be that the telegraph is not a one-to-many medium like broadcast radio and television; the telegraph does not allow for ubiquitous (tele) presence.

7 I should add that transmissions technologies transmit information at the speed of electromagnetic waves, not the speed of light as this would require a vacuum. I will use absolute speed, limit speed or speed of light interchangeably with the speed of electromagnetic waves.

8 Virilio uses the exclamation point in relation to now to stress the intensity of time and is a moment that happens “right now!”

9 According to Virilio, real time is a barrier because it is the incarnation of the cosmological constant of the absolute speed of light. Unlike the barrier of the speed of sound, the real-time barrier cannot be overcome because no further acceleration is possible according to the laws of physics. Societies in possession of tele-technologies are currently crashing into the real-time barrier. For Virilio, this event is significant; if social and historical change occurs because of acceleration, no further change is possible. Virilio recognizes, however, that people still live in real space. He argues that society is no longer divided into North and South, but into the distinct temporalities of absolute and relative speed. There is “an even more radical divide between those who will live under the empire of real time essential to their economic activities at the heart of the virtual community of the *world city*, and those, more destitute than ever, who will survive in the real space of *local towns*, that great planetary wasteland that will in future bring together the only too real community of those who no longer have a job or a place to live that are likely to promote harmonious and lasting socialization” (Virilio 1997:71).

dynamic vehicles gives way to the “immaterial” network of fiber-optic cables, satellites, personal computers and server farms that transmit information. “Space” is consequently no longer found in geography, but in electronics (Virilio and Lotringer 2008:115). This electronic space is the void of real time in which information reigns supreme and the volume, matter and gravity of real space vanish.

Absolute acceleration effectively exterminates matter; indeed it must eliminate matter because only information can travel at the speed of electromagnetic waves (Virilio 2007:49-50). According to Virilio the “limit-speed of the waves which convey messages and images is the information itself” (2000a:141). Information is absolute speed irrespective of its content (Virilio 1995:138-140; 2000a:140-141). Unlike the atomic bomb, however, the “information bomb” of absolute speed does not eradicate matter.¹⁰

If we recall that the quick dominate the slow, we can interpret Virilio's argument about absolute speed exterminating matter as “information dominates matter due to its greater speed.” Information thus replaces rather than exterminates matter. Events and actions that used to occur in real space can be replaced by tele-action and tele-presence; because they are mediated by absolute speed they move into real time. The decline in physical letters and the explosion of e-mail since the advent of the World Wide Web are cases in point. Tele-technologies invent work that can as easily be done at home as in the office and, similarly, other actions are moved into real time, for example, commuting becomes tele-commuting, viewing becomes tele-viewing and shopping is done by browsing online stores (e.g. Amazon.com or the iTunes Store) rather than by traveling to real-space stores.¹¹

In real time, everything is ubiquitous in space and occurs at absolute speed. There is no “here and now” in real time, everything is “right here, right now!” (Virilio, 1997:9,

10 There is, of course, a phenomenological core to this argument. Virilio is concerned about the substitution of the real space of reality by the virtual reality of real time.

11 While telecommunications promise to replace travelling by enabling actions to be done at-a-distance, it does not mean that tele-action actually replaces action taken in real space. For example, tele-work and tele-conferencing can, in theory, reduce necessary travelling time. Empirical evidence from Germany, however, shows that tele-work has yet to reduce the travel time of teleworkers – one study even found that teleworkers travelled more than conventional workers due to the need of teleworkers to establish contact with clients (Fuchs 2008:140-141).

39; 2007). Real time thus represents the end of geography and temporal succession: a non-space and non-time.

Non-space

At absolute speed the distances and delays that make up the world of distinct events and locations amount to nothing; it represents the “end of space of a small planet” (Virilio 1999:31; 2000a:7, 116). The world implodes when any place on earth (or for that matter anything that is mediated by tele-technologies) is in electro-magnetic proximity to any (and every) other place (Breuer 2009:232-235; Virilio 1977:141; 1991:59; 1997:58, 132; 2000a:59). Electro-magnetic proximity is a new type of locality in which events, people and things are no longer located in a specific spatial location, but are instead tele-present here and there at the same time (Virilio 2007:26, 49). In other words, everything becomes ubiquitous; everything is everywhere at once.

Physical displacement is replaced by the continuous emission and reception of instantaneous information. In real space, the event has a particular here and now because it is structured by the intervals of space and time, but when mediated by telecommunications it occurs in a “*place of the no-place* of a tele-action that is no longer the same as the here and now of immediate action” (Virilio 1997:17). Virilio explains the compressive effects of telecommunications in the following quote:

If... two interlocutors communicate with each other through (real-time) interactive technologies, it is the absolute speed of radiation that will facilitate...their face-to-face encounter, and this happens no matter what intervals of space and time effectively separate them. Here, the event *does not take place*, or, more precisely, *it takes place twice*... the unity of time and place being split between the emission and reception of signals, here and there *at the same time*, thanks to the power of electromagnetic interactivity (1990:45).

Through broadcast technology or a many-to-many medium like the internet, the event or the presence of the event is multiplied (Virilio and Lotringer 2002:68). With television, viewers are co-present as spectators of the event they are watching, regardless

of where in real space their screens are located. The tele-viewers are co-present here, there and everywhere. Tele-viewing and co-presence to an event, which is also the proliferation of the event, can only take place because of the absolute speed of light; it occurs according to the interval of light (limit speed) (Virilio 1990:44).

Space no longer orders co-existence and the earth is no longer fragmented and divided, but transformed into a continuum where everything is pushed together. Although the spatial binaries we use to interpret (real) space were eroding under relative acceleration, under the pressure of real time they become meaningless because spatial boundaries collapse and oppositions are reversed (Virilio 2000a:10, 14). Virilio writes that “[w]ith the interfacing of computer terminals and video monitors, distinctions of *here* and *there* no longer mean anything... the difference between ‘near’ and ‘far’ simply ceases to exist” (Virilio 1991:13).¹²

The ordered space of real space is transformed into a singular space or field with the advent of real time. When space is singular distinct places are interchangeable. The global is tele-local, i.e. local at a distance, or simply *glocal*. Space is not annihilated by time, but rather disappears in time because there is no distance between two or more points in space (Virilio and Lotringer 2002:77).

The non-space of ubiquitous tele-presence is what Virilio refers to as globalization. His conceptualization of globalization is not tied to space; it does not simply mean “the world is getting smaller” and that we are experiencing a more intimate co-existence in space. Virilio argues that globalization can only occur because the expanse of real space is eliminated by the speed of light. Globalization is not merely about speed: it *is* speed, the absolute speed of light. The surface of the earth is replaced by the light of the global speed of the interface of transmissions technologies (Virilio 1995:33; 1997:149, en10; 2000a:122-123). The interface replaces the surface when “all surfaces of the globe are directly present to one another” (Virilio 1989:59).

While an event cannot be located to a specific location in space, it does in fact take place, i.e. occurs in time. According to Mike Crang, Virilio argues that co-existence

¹² See also Virilio (1995:35; 2007:94).

is now ordered by time, which is a radical departure from the Leibnizian conceptualization of space and time as the respective orders of co-existence and succession (2007:69). It is not, however, a simple inversion of Leibniz; co-existence in time can only occur with a form of time that has neither succession nor duration. It is an intensive time that exposes itself instantaneously rather than time that passes and unfolds chronologically (Virilio 1991:14, 63).

Time and non-time

When the extension of real space is eliminated, so is its associated time of duration. Thus, the absolute speed of real-time telecommunication technologies abolishes time as well as the space of gravity, extension and matter. Real time is therefore a non-time, or rather a form of time that is intensive and has no duration.

Computer programmers and systems designers use the term “real time” to mean something “occurring immediately,” typically used to describe operating systems that can respond rapidly to data input (Hassan 2009:89). Although Virilio’s use of real time partly refers to this technical perspective, immediacy is secondary to the compressive effects of the absolute speed of telecommunications on real space. In *The Metaphysics of Virtual Reality*, Michael Heim writes that real time is “simultaneity in the occurrence and the registering of an event, sometimes called synchronous processing” (1993:157). Robert Hassan argues that the distinction is significant:

Immediately connotes a brief temporal lag (be it measured in minutes, seconds or even nanoseconds. Heims’ *simultaneity*, however, suggests “happening at the same time,” a cancelling-out of temporal duration, delay, or latency between events. *Simultaneity* implies, then, a nontime, the shattering, or voiding, or “death” of time (2007:49).

Crang supports the argument that the main impact of telecommunications is the changes in the “sequencing of events, where one event needs to happen before another. Real-time compression means more and more is simultaneous” (2007:76). The primacy of the order of succession, the “present” time of real space, is eliminated by removing it

from its here and now (Virilio 1990:46; Virilio 2000a:118; Virilio and Lotringer 2002:85). Virilio even refers to real time as the “era of simultaneity,” where the chronology of past, present and future loses both its importance and meaning. The intensive time of simultaneity has no duration. It is always right now! Events occur simultaneously and instantaneously. Time exposes itself (like light on a photographic plate) and the unfolding of time is experienced as a series of discontinuous moments one after another or, in other words, an eternal present (Breuer 2009:233; Virilio 1997:10; 2007:23, 49).

It is important to bear in mind that real time is a form of space-time because events do actually occur, but not anywhere that can be specifically located in the space-time that correspond to real space. The ubiquity and simultaneity of absolute speed are therefore ways in which to conceptualize the topsy-turvy space-time of real time. When absolute speed negates the intervals of extension and duration, it privileges a now-here! of nowhere. Real time society is thus “a *live* (live-coverage) society that has no future and no past, since it has no extension and no duration, a society intensely present here and there at once – in other words, *telepresent to the whole world*” (Virilio 1997:25).

Immediacy and interactivity

Intensive time can, of course, also be immediate in addition to being simultaneous. In real time the actions of real space with given durations, successions and specific locations are replaced by the immediate *interactions* of telecommunications. Interactivity is the “catching up of simultaneity with the real space of chronological and historical succession” (Virilio and Lotringer 2002:78). Virilio explains interactivity in terms of the echo chamber: when I speak in an echo chamber my words come back immediately. Virilio's point is that because the expanse of the earth is reduced to nothing at the absolute speed of light, the earth is transformed into an echo chamber in real-time society. The “speed of light makes it so that in a few fractions of a second I can interact, inter-see, inter-hear, etc.” (Virilio and Lotringer 2002:77-78). Interactivity is thus nothing but the echo effect, but would be impossible if the expanse of the earth were light years

rather than kilometres. Whenever technologies harnessing the speed of light are used, in effect any tele-technology, the earth transforms into an echo chamber.

Interactivity and immediate real time is therefore a brief temporal lag, i.e. not something that occurs simultaneously and instantaneously. I will return to this important point in the next chapter, where I argue that capital can control and exploit the absolute speed of real time if, and only if, it is “immediate.”

Generalized arrival

In real time “everything” has already arrived (Virilio 1999:31). Virilio refers to this as the “generalized arrival” of the absolute speed of the real time of telecommunications. With this concept, he refers to a situation wherein “everything arrives without having to leave” (1997:16; see also 2007:49). For reasons that will become clear, this is the most fruitful Virilian concept to analyze digital piracy.

Generalized arrival is an outcome of the absolute speed of telecommunications, and should first be contrasted to transportation's limited arrival. Movement across real space supposes the chronological unfolding of departure, journey and arrival, and occurs between the two unique locations of the points of departure and arrival. Consequently, the journey can be measured and interpreted in terms of the real-space intervals of extension and duration. Because the journey is bounded by departure and arrival, it can be considered the cocoon of movement in real space. If movement does not assume the journey-cocoon it is not movement but transmission and generalized arrival of information.

In real space, the length of journeys and the scope of physical movement are aspects of the extension of real space, simply because with physical displacement a thing (or person) moves from its point of departure to its point of arrival. Assuming speed is constant, the further the destination is removed in space, the longer it will take to get there. At relative speed, particularly metabolic speed, the journey is always privileged; both departure (the start of a trip) and arrival (a stopover or the end of a trip) are limited and relative to the duration of the journey.

With the revolution in transportation and the introduction of compulsive technological acceleration, the ratio between the three moments of displacement is altered (Virilio, 1995:131; 1997:56; 2007:127). When the journey is shortened, the moments of departure and arrival, while still limited, become more important; relative to the journey they now take longer, even though the absolute duration of departure and arrival remain unchanged. With absolute acceleration, the journey is atrophied to the point where it becomes needless, because as the extension of space is eliminated, so is the journey (Virilio 1997:34). After the revolution in transmissions, however, “everything” arrives without necessarily leaving (Virilio 1991:15, 98). At absolute speed the journey loses its successive components; departure is eliminated alongside the journey, and arrival is no longer a stopover or the end of a trip. The restricted arrival of transportation gives way to the continuous and generalized arrival of transmissions (1997:16, 56, 143). Arrival becomes generalized through the compressing effects of telecommunications. Under conditions of simultaneity, the chronological unfolding of departure, journey and arrival are compressed into a simultaneous and intensive event of arrival: as soon as information “departs” it arrives, which is at the same time its “journey”. Journey and departure collapse into arrival because information does not necessarily move intact “as one” like a physical object, but continuously as parts of a larger whole.¹³

Because information neither leaves nor moves, but only arrives, generalized arrival should not be understood in terms of movement in the traditional sense.¹⁴ Copying, reproduction and multiplication are more appropriate synonyms for this concept, especially when we consider the examples of broadcast television and the operations of the computer.

In the case of television and the tele-viewer, the actual data are not copied but the broadcasted event or program. Bearing in mind Virilio’s argument about the real-time face-to-face and the live-coverage society, the “copying” refers to the tele-presence of the

13 Transportation keeps the object intact and protects its originality, while transmissions splits it up into packets and reduces it to one copy among many.

14 Although this is how we refer to our actions on the internet, by using language such as “visiting” webpages and “sending” e-mail (which implies departure and journey alongside arrival).

television spectators. We have the following equation: event multiplied by audience equals number of copies.

Generalized arrival also describes the basic operation of the computer. In essence, computers are machines that rearrange bits by storing, moving, transforming and copying data, and higher functions are simply scaled up iterations of these operations (Silberschatz et. al. 2009:9-12, 463-464; Doctorow 2004:18; 2007:27). While these operations are often referred to by various terms such as “read,” “write” or “load,” they can all be described by the umbrella term of “copy.” The copy command has been an integral command of file management and programming languages since the 1960s, and networked computing made the centrality of this command more apparent (Parikka 2008:72).

When I run a program on my computer, the data of that program are copied from storage (non-volatile memory) to the (volatile) memory of the computer. The program is not moved at one stroke from one location on my computer to another, but exists in both places simultaneously.¹⁵ The program never “leaves” the location on my hard drive; it just arrives into my computer's memory. A simpler example of this process is the transfer of my document from my laptop to my flash drive; I simply copy the document. My argument is that everything we do involving computers is essentially identical to this process. It makes no difference if my computer is networked; the same operations still apply. For example, when I download a zip-folder of music from a weblocker¹⁶ service, such as Rapidshare¹⁷ or Hotfile,¹⁸ that file never leaves the server, but starts arriving as a copy on my computer immediately after my interaction of clicking on the download link.¹⁹ Even just viewing digital information, such as visiting a website, makes copies.

15 More precisely, only the parts of the digital data that comprise the program exist in both the volatile and non-volatile memory of my computer. Typically, only those parts of the program that the computer needs at a particular time are copied into random access memory for quick retrieval.

16 A weblocker is a storage space where people can deposit files. Every file acquires a unique address (read download link), which can be shared with others.

17 <http://www.rapidshare.com>

18 <http://www.hotfile.com>

19 I should note that downloading something does take time, i.e. has duration. The larger a file is and/or the lower the bandwidth, the longer time it will take for the entire file to arrive. However, bandwidth measures the amount of data transmitted, not the speed with which it arrives. While downloading a

“Technically, every act within cyberspace involves copying material from one computer to another” (Barbrook 2005).

Jussi Parikka argues that there is “no point in making copies without distributing them” (2008:76). Just as Benjamin (1936) saw how distribution was inherent to mechanical reproduction, copying is inherently linked to distribution in the internet copying machine (Parikka 2008:76). Generalized arrival describes the collapse of reproduction and redistribution into the same moment. More precisely, absolute speed requires such compression. Reproduction is therefore a condition for transmission-distribution at absolute speed and is, in fact, why digital data are hypertrophic and have the special characteristics of non-rivalrousness and non-excludability of use and consumption. The “digital advantage” does not derive from something inherent in the digital itself, but is an effect of the absolute speed at which it is transmitted and the condition of generalized arrival (itself an effect of the ubiquity and instantaneity of real time). Generalized arrival is the most salient of Virilio's concepts to analyze digital piracy because it helps to explain the ecosystem in which instant butterflies evolved and currently thrive.

We can now start to appreciate the argument that digital piracy is an effect of circulating capital hitting the wall of real time. We cannot, however, understand digital piracy as an accident of value before I introduce Virilio's argument concerning the accident.

The primacy of the accident

Virilio's concept of the accident has several distinct meanings. His use of the term can at times be confusing, in no small part due to his playful use on its different meanings. The “accident” is used in relation to religion and science, spiritualism and materialism,²⁰ knowledge, time and space, terrorism, inventions of technology and virtual reality; it is

movie of 700mbs at an average of 200kb/s takes approximately 60 minutes, the data that instantaneously and continuously arrive for the duration of downloading do so at the speed of electromagnetic waves.

20 The *Original Accident* (2007) can then be the accident of the Big Bang that started the expansion of (substance in) the universe or the divine *ex nihilo* creation of the heavens and the earth.

employed in its philosophical and phenomenological meanings, referring to properties of substance, and in its lay dictionary meaning as disaster, and as something unexpected, undesirable or unintentional (e.g. a material object breaking after stress). The lay meaning is further complicated by Virilio's qualifying accidents as localized and generalized. When he deploys it in the philosophical meaning he complicates the accident's relationship to substance, suggesting that it has reversed. What all of these various meanings of accident and its relation to other phenomena share, is that they are conditioned by speed and acceleration (Virilio 1991; 1994; 1995; 1997; 2000a; 2007).

I cannot do justice to the entirety of Virilio's accident argument, and in any case that would be beside the point of this thesis. I will use and employ the concept based on what I can do with it and how it helps me conceptualize digital piracy as an effect of the increasing velocity of circulating capital. Nevertheless, how I will use the concept, albeit with some modifications, is how Virilio typically employs it in its philosophical meaning and in its meaning as an unintended and unexpected disaster (see e.g. 1991; 1997; 2007).

What interests me regarding the philosophical meaning of accident is that absolute speed reverses the relationship between substance and accident. As I will argue below, this post-modern reversal is, in a nutshell, a philosophy of digitization, as I would call it accidentalization. The accident-as-disaster is vital for my argument because from the point of view of the circuit of capital, digital piracy is an accident of value. These two conceptualizations of the accident, reversal and disaster are related. How Virilio connects these two different conceptualizations are also useful, though again with alterations, for my purposes. Virilio connects these two meanings of accident in his view of virtual reality (the light of speed). He considers virtual reality to be a generalized accident of the natural day, the natural body and reality: the phenomenological bodily orientation in real space and direct encounter with reality is substituted by an indirect and technologically mediated encounter of virtual reality with an inert body.

With respect to the circulation of capital the relationship between the two meanings can be captured in the statement, "the digital piracy accident of value is an effect of the accidentalization of the commodity form." From the point of view of capital,

digital piracy is an unexpected and undesirable disaster when capital crashes into the wall of real time and explodes into byte-sized instant butterflies. I proceed with this argument by a discussion of the philosophical meaning of the accident, its relation to substance, and with reference to 3D printing, I explain how the reversal of the relationship between substance and accident explains the process of digitization. I briefly consider the accident in its meaning as disaster.

The substance/accident reversal

Virilio suggests that after the revolutions in transmissions and the advent of absolute acceleration, the original relationship between the substance and accident reverses. He writes that, “while modern philosophers claim that *the substance* is essential and *the accident* relative and contingent, the postmodernists say we are seeing a reversal of this, term for term, since it is the accident that becomes *absolute* and substance, any and every substance, *relative* and contingent” (1997:71).²¹

I argue that this reversal can explain the process of digitization, which is a prerequisite of digital piracy. It is only when matter and/or analog data streams are universally rendered into the singular form of binary code that the digital piracy as an accident of value can occur. To put it more dramatically, digitization is the information bomb that obliterates matter and allows for absolute acceleration of objects that previously could only move at relative speeds. In order to properly get at this argument, however, I first discuss what substance and accident are, and how they were originally related.

According to Aristotle, a substance is “whatever is a natural kind of thing and exists in its own right” (Magee 1999). The substance does not exist in any other thing and cannot be said be of anything else; it is therefore the immutable essence of objects. A rock is the same regardless of its colour, weight, location and so on, and exists in and of itself (Cubitt 1999:134; Magee 1999). Substance is “what is” and in most contexts it is

²¹ See also Virilio (1991:48, 68, 96).

used as a synonym for amorphous matter or that which is real and solid, i.e. substantial rather than virtual (Virilio 2007:39, 53).

The accident, on the other hand, is “what occurs” and according to Aristotle is what reveals the substance (Virilio 1997:123; 2007: 5).²² The accident is contingent on the substance and does not have an independent existence. It is always *of* a substance; accidents are alterations that happen to the substance, but ones that do not change what the substance is. For example, rocks can have different features, such as colour, weight and different locations in space, but are still rocks, not accidents. The accident is thus the form in which substance presents itself to perception (Cubitt 1999:134). This is important for my analysis because when the accident has shifted into the light of real time, I can have a phenomenological encounter with accidents without substance.

The accident appears in the phenomenological encounter with a particular substance. This encounter includes the accidents of time (history and decay) and place (location). Even the sound of an object is one of its accidents, whether played back from the grooves of a vinyl record, conch shells or the sutures of a human skull.²³ What matters is that they are sounds *of* something. Not only are the grooves of a vinyl record accidents, but so are the sounds that are made when the record is played back. In fact, all of Kittler’s (1999) analog data streams are accidents. The chemical imprint that forms the image on film is an accident, and so is the appearance of movement when 8mm film is played back at various speeds per frame. The imprints that typewriter’s typebars make on paper are also accidents. If the accident is what occurs, then accidents can be conceptualized as the information of an object. For example, a rock that is sharpened into

22 Aristotle had ten categories in which things naturally fall: the substance and the nine accidents of quantity, quality, relation, action, passion, time, place, disposition (the arrangement of parts), and raiment (whether a thing is dressed or armed, etc.) (Magee 1999).

23 In Kittler’s discussion of the analog gramophone as the recording and playback medium of the Lacanian real, he draws on Ranier Maria Rilke who argued that the coronal suture is an inscription of the real. In “Primal Sound,” his essay on brain physiology, Rilke argues that playback of the coronal suture by a gramophone needle yields a primal sound that no one named or notated. It is real because it does not pass through the bottleneck of the symbolic order. While the symbolic is pure signal, the real consists of both signal and noise. The gramophone records the real because, like the human ear, it cannot discriminate between noise and signal (Kittler 1999:38-42).

a tool embodies the information of the rock's new shape. All physical objects are different forms of records because they have the capacity to store information (Galloway 2004:72). When the accident becomes absolute, all that is left is information.

Substance and accident have a contingent relationship: substance is the support of the accident, which in turn is what occurs to the substance. The relationship can be further explained by relying on the Latin: *accidens* means “what crops up” from; the *substare*, meaning “what is beneath” (Virilio 2007:10). While substance is necessary for the accident, substances never exist without accidents. However, substance is always logically prior to its accidents according. Virilio approvingly cites the late medieval philosopher Nicolas of Cusa on the relation between the substance and the accident. This quotation is important considering that Virilio views substance as matter:

The accident ceases to exist when the substance is removed, and its ceasing to exist in that instance is due to the fact that to inhere is of the nature of an accident and that its subsistence is the subsistence of the substance. Yet it cannot be said that an accident is nothing... An accident gives something to a substance... in fact, an accident gives so much to a substance that, although the accident had its being from the substance, *the substance cannot exist without any accident* (Virilio 1997:17).

We can now begin to appreciate what the “term for term” reversal of substance and accident means. A reversal is significant because it is a clear break with how the traditional philosophers view both the substance and accident. It is not clear whether Virilio agrees with the postmodernists that the reversal has happened, like Baudrillard (1994) does when he argues for the precession of the simulacra. In *The Lost Dimension*, Virilio asks if we are ready to accept this reversal (1991:48), but in *Open Sky* (1997) he appears to agree that the reversal has happened.

That Virilio uses the terms relative and absolute to describe the relationship of substance and accident is significant. They respectively refer to the limit speeds of real space and real time. Considering that real space itself is substantial and material and is the space in which matter is physically displaced, substance is privileged in real space. In this formulation Virilio implicitly reiterates that matter moves at relative speed whereas

information is transmitted at the absolute speed of electromagnetic waves. This also suggests that substance is contingent on the accident because the latter dominates the former by its greater speed.

Digitization is a form of acceleration that allows accidents previously tied to a material container to reach the speed of electromagnetic waves. In arguing the reversal, Virilio says that the accident is absolute because it occurs at the absolute speed of light and consequently the accident comes to dominate “any and every” substance that is conditioned by the relative speed of matter. If the reversal is term for term, the accident is logically prior to substance, but it is still dependent on substance. The reversal can be taken even further, to say that when the accident shifts into the real time of transmissions it becomes independent from and can exist without substance. The accident is still “what occurs,” but what actually occurs is only the illumination of the light of speed. For Virilio, the “problem of the accident has shifted from the space of matter to the time of light” (1997:17). The problem of the accident is no longer related to any substance as such, but is a problem of the accident itself. When the accident shifts into real time, it uncouples itself from and is no longer of any substance. I argue that the speed of light does not simply reverse the relationship, but actually enables the accident to become independent from the substance.

I should note that while the accidents in digital form can exist without their analog substance, they are dependent on a material environment, the space of electronics. Accidents can be put on display only through material media such as monitors, and between the acts of performing its surface effects, digital code is stored in various physical media. While dependent on a material container, accidents in digital code are not dependent on a particular container simply because they can be copied and transmitted to any digital device capable of receiving electromagnetic signals (Vuorinen 2007; Manovich 2001:73; Wolf 2000:66-69).²⁴

²⁴ Digitized accidents are not accidents of the substances of display and storage media. These media have their own accidents, such as the rectangular shape of the computer screen, the movement of the spinning disk of the hard drive or the sound the CPU's fan makes. If digitized accidents are of any substance, it could be the digital code itself considering that it's from these runes that surface effects are conjured.

My reading of the reversal is not necessarily consistent with Virilio's phenomenology. Sean Cubitt argues that absolute speed first eradicates the substance and then the accident. This is the generalized accident – the accident to end all accidents (Virilio 1997:70). The reality of an object, its necessary substance and relative accidents, and reality as such are substituted by virtualization (James 2007:45-66; Cubitt 1999:134-135). While Cubitt provides a phenomenological reading consistent with Virilio, because in the anti-human space of real time, the body cannot be orientated naturally in relation to the object, he closes off other uses of this concept. I choose to read Virilio's reversal of the substance and accident as a philosophy of digitization. The following passage is exemplary of using Virilio's argument about the reversal of such a philosophy: "the accident has shifted from the space of matter to the time of light" (1997:17). As the accident moves away from the real space of substance into real time, it becomes information. It is accidentalized.

If absolute speed reverses the relation between substance and accident, the accident of place and of presence "here and now" becomes ubiquitous tele-presence. As discussed above, telecommunications replaced co-existence in space with time. It is not the substance that co-exists in time; an object made of matter is unique because it has a unique location in space. It is the accident that is ubiquitous, existing both here and there. For Virilio the accident is first and foremost an "*accident of transfer* of the limit-speed of electromagnetic waves, a speed that now allows us not only to hear and see at a distance, as we were already able to do with the telephone, radio or television, but actually to act at a distance" (1997:17).

If the accident is related to an accident of transfer of electromagnetic waves and is somehow related to the simultaneous and ubiquitous effects of telecommunications, we have another clue that the accident is interchangeable with information and (absolute)

However, even digital code is comprised just of accidents; 0s and 1s to the human eye; punch cards to Babbage's difference engine; or the differences in voltage to the electronic computer. Perhaps the substance *is* the electronic pulse, the electromagnetic wave or even the light of speed considering the electronic pulse is the only physical form left because of digital data's radical independence from any particular container. I will not dwell on this further as this particular philosophical problem would undoubtedly require another thesis.

speed. These accidents are moved into the time of light because they have only a temporal existence as a series of moments, not as substance in space. With the generalized arrival of information of, for example, broadcast TV, the information consists of the accidents of the sound and image of an event. The tele-viewer does not view something substantial; all that occurs is that the light of speed illuminates the retina of the viewer. Similarly, when it comes to the interaction of, for example, tele-surgery, the doctor fitted out with haptic feedback technology “here” can perform surgery on the accidents arriving from a body “there”. The surgeon does not interact with a substantial body, only with the accidentalized body that instantaneously and continuously arrives from the robotic extensions of the surgeon's hands, arms and eyes in the actual operating theatre. The atoms of the body are translated into bits that are transmitted according to the generalized arrival of information.

When something is digitized it exists only conceptually or symbolically, which represents the primacy of images and signs over material objects. Information in the form of digital code does not have the properties that differentiate physical objects. They must instead be put deliberately on display to render their qualitative differences as objects intelligible to the human eye (Betancourt, 2006; Galloway, 2004:74; Wolf, 2000:65, 68). Kittler argues that digitization erases differences among analog media and that their previous distinctions are reduced to “surface effects, known to consumers as interface” (1999:1) or, according to Michael Betancourt, “superficially distinct forms” (2006). In other words, the surface effects are accidents because they are “what occurs” when digital code is put on display by the magic of the double click. In digital form any and all accidents are of the singular substance of 0s and 1s. We need to think of this substance not as matter, but as that which is beneath (*substare*) the surface.

In the process of digitizing analog media, where matter is converted to information, the accidents of sound, image and text are made independent of their respective substance. Digitization obliterates the substance but leaves the accident. It is because of this obliteration that I prefer my neologism *accidentalization*. While Cubitt argues that the accident together with the substance is substituted by a virtualization of

the object, I argue that the accident remains because it is possible to have distinct phenomenological encounters with binary code when it is deliberately put on display. My argument can be made clearer with reference to 3D printing, which is a process that can transform bits into atoms.

3D printing²⁵ refers to a group of technologies that can translate virtual 3D plans, like a computer-assisted design file (CAD), into three dimensional material objects. A 3D printer is, in essence, the same as a normal printer, but one that prints three-dimensional objects rather than two-dimensional images. This is accomplished through either a subtractive process, in which the printer head cuts out the object from e.g. a large sheet of metal,²⁶ or a additive process where the printer head builds the three dimensional object from scratch by depositing various inks one layer at a time (Gershenfeld 2005). 3D printer “inks” include ceramics, circuitry, plastic polymer, metal and even stem cells for printing body parts (Economist 2010).²⁷

In the case of 3D printing, the substance is by default relative and contingent.²⁸ A 3D printer requires a description of the design object in order to print an output. The design is the information about the features, or the accidents, of the object. Designs can be made from scratch using CAD-software (e.g. AutoCAD or Google SketchUp),

25 3D printing is also known as “rapid prototyping” or “fabbing” (fabrication) (Gershenfeld 2005).

26 Subtractive 3D printing is in essence an automated machine tool. Most commonly subtractive printing uses a tool called a sign cutter mounted onto a moveable arm that is operated by a computer controller that reads pre-programmed commands (so called CNC, computer numerically controlled). At its simplest subtraction is the computerized equivalent to a pair of scissors on moveable arm cutting a shape out of paper or cardboard. Other subtractive tools include high-powered lasers, jets of water, rotating tools, beams of atoms or jets of gas (Gershenfeld 2005:67-68).

27 The final frontier of 3D printing is what Gershenfeld (2005) and Sterling (2005:102-106) refer to as the personal fabricator (PF), which is a machine that makes machines. A PF can print not only things in three dimensions, but also integrate “logic sensing actuation and display – everything that is needed to make a complete functioning system” (Gershenfeld 2005:3-4). This requires a single print cartridge being able to contain “inks” to print circuitry, magnetic materials, chemicals and so forth in addition to plastics, metal. Currently there are inks for each of these, but the challenge for creating a PF is to integrate them all (Gershenfeld 2005:101). With a PF it would be as easy to download and print out a fully functioning mobile phone as it is to download and play a piece of music in Mp3 format. The future 3D printer is the fabricator that relies on nanotechnology to build an object atom by atom (see e.g. Drexler 1986) similar to the replicators used in the TV-series *Star Trek: The Next Generation*.

28 In fact, it is not that different from any other type of output device that transforms digital data into sound, image or text. In could be argued that a printer or for that matter any output device (speakers, monitors, etc.) prints accidents.

downloaded from websites like Thingiverse²⁹ or by scanning real objects using a 3D scanner. With CAD software the accidents of the object can be modified: some advanced programs have the added features of modeling the behavior in addition to the shape of the object. Finite element analysis (FEM) permits testing of how a specific design will respond to nearly anything, such as force, vibration, heat, airflow, magnetism and so on (Gershenfeld 2005:128).

With CAD-software the accident is absolute, or logically prior to substance in two ways: in the autonomous existence of the features of the substance and through FEM, which plans for or tries to eliminate the accident that occurs when the substance breaks. The argument that the accident is logically prior is very similar to Baudrillard's (1994) argument about the precession of simulacra in postmodern society. In Virilio's terms, CAD files can be considered to be a third order simulacrum because the accident (both as the features of the object and the disaster) precedes the reality of the substantial object.³⁰ CAD files and other objects comprised of digital code are also simulacra in the sense of being copies without originals.³¹ There is no original digital object because all copies are identical. They all are, for all intents and purposes, all originals.

When the accident is absolute the features and characteristics are logically prior to the substance because the accident no longer needs a substance to exist. If an object is created in a CAD file, it exists only as accidents (shape, colour, movement); I can have a phenomenological encounter, albeit one that relies on display prosthetics, with this object as a pure accident, a pure abstraction before it becomes a material, sensuous object.

The output of a 3D printer is a material object with an essential substance and relative accidents. It makes the object substantial by *printing it into real space*, the space structured according to extension and duration. Although it is a form of digital production, the object becomes mechanical in the Benjaminian (1936) sense; it is unique

29 Thingiverse is a website for sharing digital designs for subtractive or additive 3D printing (<http://www.thingiverse.com/>).

30 Virilio, however, disagrees with Baudrillard over what happens to reality. Whereas Baudrillard (1994) argues that reality is simulated and cannot be distinguished from reality, Virilio argues that reality is substituted by virtual reality. Virilio argues that we can choose the reality of real space over the virtual reality of real time.

31 This begs the question: is digitization a materialization of Baudrillard's (1994) third-order simulacra?

because it has its own specific history and a location in space that no other object can occupy. The materialization of the object is at the same time its deceleration because any substantial object can only move at the relative speed of transportation.

These accidents, however, need not become a material output. They can exist purely as accidents in the form of a virtual object in a CAD file without ever becoming substances. In *Shaping Things*, his speculative book about the future of design, Bruce Sterling writes that he is sometimes better served with a representation of the object he wants. If he were to create a new object, he would be “burdened with the weighty physicality” and “troubled by [the] stubborn materiality” of the object. He prefers the conceptual 3D model with “no gravity, no friction,” that can be transmitted anywhere in the world. For Sterling, the digital object is not longer a model; it is prior to and has priority over the physical object. The substantial object is “merely hard copy... mere industrial output” (Sterling 2005:95-96).

Sterling considers a physical object as too small and parochial for an inherently global world of telecommunications. A physical object loses its importance for a large number of people too quickly, because a “real, physical thing occupies too small a piece of space and time” (Sterling 2005:105). Sterling’s concern is about design; he wants to source skills and insights in the design of the object from as large a crowd as possible (2005:105-106). Design can be crowdsourced³² only when labour becomes global tele-labour. Virilio would likely argue that Sterling prefers the digital object because of the ease and speed with which he can alter its accidents and transmit it at the speed of light. It is an inherently global object that exists here and now! The accident of place is a generalized accident because objects in digital code are ubiquitous and co-exist in time rather than space.

Accidents and disasters

³² Crowdsourcing is a neologist compound of outsourcing and crowd combining coined by Wired editor Jeff Howe (2006). Howe defines crowdsourcing as “the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call” (2010).

Virilio argues that a society that... privileges the present, real time, to the detriment of past and future, also privileges accidents. Since, at every moment, everything happens, most often unexpectedly, a civilization that implements immediacy, ubiquity and instantaneity, stages accidents and disasters (2007:23).

When the substance is accidentalized, accidents will occur. The recognition that accidents will occur and the subsequent planning for their occurrence, e.g. through FEM or digital rights management (DRM), also makes accidents absolute. In other words, when real-time societies have ceded nearly all of their control to the logic of speed, accidents are always nigh. Virilio's accident-as-disaster argument relies on his novel interpretation of the relationship between the substance and accident in terms of technological inventions, in particular the media of transportation, transmission and communication.

Virilio argues that whenever a substance is invented, in particular dynamic vehicles, so is the unexpected disaster that crops up when the substance physically breaks through entropy, decay and stress, or when control over its speed is lost. The accident "signals the unanticipated, *that which unexpectedly befalls* the mechanism, system or product, *its surprise failure* or destruction" (Virilio 1993:212). Technology has a hidden logic; the necessary occurrence of accidents. There "is no technical invention without accidents. Each time a technology is invented, a technology of transport, of transmission, or of information, a specific accident is born" (Virilio and Baj 2003, qtd. in James 2007:116; see also Virilio 1993:212; Virilio, Kittler and Armitage 1999:84). In the *Original Accident* Virilio states that to "invent the train is *to invent the rail accident* of derailment. To invent the family automobile is to produce the *pile-up* on the highway" (Virilio 2007:10). If the invention of the substance is the invention of the accident, it works the other way around as well: "[t]he shipwreck is... the... invention of the ship, the air crash the invention of the supersonic airliner, just as the Chernobyl meltdown is equally the invention of the nuclear power station" (Virilio 2007:5).

In old technologies, specifically those with relative speed that occur in real space, the accident is local. The car crash and the derailment are particular accidents with

limited effects and extension. With information and tele-technologies, however, the accident is no longer particular, but generalized and global. The analogies Virilio uses for these new integral accidents are Chernobyl, the stock market crash and those credit and currency crises that are the outcome of so-called program trading or financial systems beyond human comprehension. The stock market is so complex and changes so fast that the human brain can neither cope with the amount of data nor react and make decisions quickly enough to satisfy the whims of the market deity. Another example is the internet worm that infects and wreaks havoc on millions of computer systems worldwide (Parikka 2007:1-26). The 1997 financial crisis that rocked nearly all of South East Asia and the recent credit crisis that started with the sub-prime mortgage market in the USA but spread to Europe and literally crashed the economy of Iceland are omens of the truly generalized accident yet to come. However, considering that Virilio's arguments always have a phenomenological core, the truly generalized accident is that reality is substituted by the virtual light of real time.³³ For Virilio this is nothing but catastrophic. It is a loss of direct bodily orientation in real space due to the indirect experience of the illumination of the inert body by the light of the speed of real-time tele-technologies (Virilio 1997:56; 2007:51). This bifurcation of reality is a generalized accident rather than a local and limited one like a car crash because the generalized accident occurs at the absolute speed of light.

The accident is always unexpected and sudden. It is an unknown quantity: we can never know when a particular substance will break. However, we do try to get ahead of the accident by planning for its occurrence, with the intention of either eliminating it completely or at least alleviate its effects. Stress testing of materials, crash test dummies and pilots clocking hundreds of hours in simulators before they fly an airplane in real space are examples of planning for the accident. In this sense the disaster becomes absolute simply because we recognize that accidents do occur and we need to stop or

33 Prior to the substitution of reality by virtual reality is the substitution of the natural day with the artificial day of first the electric light and then the light of speed, which also eliminates geographical space's natural horizon with the screen. When reality is completely mediated the day will come when the day won't come (Virilio 1997).

alleviate them. The FEM algorithm in CAD software is a perfect example of planning for the accident because the substance can be tested for accidents (staged or unexpected) even before it exists in real space. FEM is the ultimate tool in the accident scientists' tool box. If an accident occurs to the accidentalized object (but one that was not even a substance to begin with), then the designer can easily modify the design of the object so that that specific accidents are eliminated or at least made less likely to occur. Most important of all, those specific accidents are no longer unexpected, and the users of the real-space object can be notified about what they should do to avoid the occurrence.

Digital rights management (DRM) is to some degree similar to FEM in that it attempts to design an object that will not have an accident, in this case, the digital piracy accident of value rather than of life and limbs. When the commodity is accidentalized, the accident of digital piracy may occur, and can subsequently be recognized by capital as an accident of value. The employment of DRM is therefore an anti-accident measure that seeks to avoid the accident of value by protecting the commodity form. DRM slows down the circulation of capital by giving the commodity substantial features and making the moment of exchange a precondition for accessing its use-value.

Before I return to DRM, I establish how and why digital piracy is an accident of value that follows from the accidentalization of the commodity form and the condition of generalized arrival. In the next chapter I will stage the accident of value that occurs when capital crashes into the wall of real time.

Chapter 3: The circulation of capital in real time and the digital piracy accident

Virilio argues that wealth is always an aspect of speed (Virilio and Lotringer 2002:16). From my discussion of the circulation of capital in chapter 1, paraphrasing Virilio, we can argue that value is always an aspect of speed.¹ Chapter 1 was, in part, a dromological reading of the process of circulation in capitalism. I established that capital's need for speed derives from its negation and devaluation for the duration it takes to metamorphose and move to the next stage. A given capital with a higher velocity of circulation will produce more surplus value and generally a higher rate of capital accumulation compared to capital with a longer turnover time. A capital with a velocity above social average turnover time is more competitive than those with velocities closer to the social average. For example, capital that circulates over integrated circuits and relies completely or in part on the tele-foundation of real time has a higher speed than capital that relies on the circulation networks of real space. The successes of Amazon and the iTunes Store versus real space retailers are cases in point.²

In his "butterfly fragment," Marx suggests that to function ideally, capital must be like Hegel's Concept, which can turn into particular concepts and back again at the speed of thought.³ The inner unity of capital is like the Concept in that capital must formally change from universal to particular economic forms in order to be capital. Because capital involves material production it must invest itself in matter, which might be resistant to it. Circulation is therefore risky. Marx (1973:403) argues that maintaining the inner unity of capital is accidental, and that ideal circulation at absolute velocity is

1 Wealth in the Marxist lexicon refers to use-values, i.e. material wealth, and is always secondary to value in the capitalist mode of production. Wealth can also be an aspect of speed if we consider the intensification of production, but surplus value, not use value, is the purpose of capitalist production.

2 Amazon relies on a hybrid of real-space and real-time circulation networks; tele-browsing and shopping, but relies on real-space transportation for bringing commodities to the consumer. Amazon MP3 and the Kindle eBook reader are examples of Amazon's pure real-time commerce.

3 On the Concept in Hegel, see Hegel (1969), Butler (1996:209-229). See Arthur (1998:110-118) for an analysis of how Hegel's Concept influenced Marx's conceptualization of capital as a circuit.

impossible for capital because it must assume material forms. It is also disastrous because it would lead to the suspension of circulation time, thus negating capital as a dialectic of production and circulation. Capital thus contradicts itself; it desires to circulate in no time, but presupposes that time passes between its various moments (Marx 1973:544-549). While capital cannot have the same fluidity and speed as the Concept, its materiality ensures that the stages of circulation have a duration that deducts from production time, and therefore, the continued existence of production based on capital.

Capital always tries to become more like its conceptual ideal by accelerating its circulation. While Marx could not find evidence of ideal circulation while writing the *Grundrisse* and did not even consider ideal circulation possible in *Capital Vol. 2*, I argue that the absolute speed of real-time telecommunications and its compressing effects enables capital to reach absolute velocity.

Chapter 2 argued that compulsive speed can accelerate beyond the relative speed limit of escape velocity only by exterminating matter. For capital to accelerate absolutely and completely eliminate its barriers of space and circulation time, it must exterminate matter in favour of something weightless. Capital can move into real time only by accidentalizing its forms. The ideal “space” for capital must be, as for compulsive speed, the vacuum where it is possible to reach the absolute speed of light. Because a true vacuum can exist only in laboratories or in outer space, the next best space for capital to circulate is the void of real time. On the integrated circuit, mediated by telecommunications and in the material form of electronic pulses, capital can circulate at the speed of electromagnetic waves, thus reaching absolute velocity. At this speed, however, capital crashes into the wall of real time. It crashes because no further acceleration is possible beyond absolute speed and because at that speed, the impact disintegrates capital in the commodity form.

The purpose of this chapter is to let capital crash into the wall of real time, to theoretically stage the digital piracy accident, an accident of value that is specific to digital computer networks. I consider the accidentalization of commodity, and how absolute speed compresses the successive moments of capital into an intensive moment

of generalized arrival. The digital piracy accident is not inevitable. If capital can force real time into being immediate rather than simultaneous, accidentalization enables digital distribution of digital commodities rather than digital piracy. At the end of this chapter I consider how the media entertainment industry plans for and tries to eliminate the accident of digital piracy through the implementation of anti-piracy or anti-accident measures, such as digital rights management (DRM). Before I discuss the respective effects of immediacy and simultaneity on capital's circuit and forms, I will clarify what I refer to as an “accident of value” and explain why the culture industry is vulnerable to the digital piracy accident.

Accidents of value

Virilio's accident argument must be taken in the double sense that I discussed in the previous chapter: accidentalized and disaster. Digitization is disastrous; the accidentalization of the commodity leads to the digital piracy accident. To explain why digital piracy is an accident of value, I apply Virilio's argument to the circuit of capital. Such juxtaposition makes sense because Marx argued that completing a turnover of capital is accidental (pp. 22-25). While I should not read too much into these two theorists' use of the same word, I argue that applying Virilio's accident argument to the circuit can clarify capital's precarious existence in each of its stages.

An accident occurs if capital does not circulate normally, that is, when it cannot “realize all the necessary moments of its self-formation” (Marx 1973:403). Completing a turnover is not guaranteed; the circuit is prone to accidents and in particular during the moment of exchange. “[I]t is a matter of accident whether or not [commodity-capital] is exchanged for money” (Marx 1973:404). Not being able to sell commodities is an accident, specifically an accident of capital. It makes capital's metamorphosis and completion of a stage more difficult and it may take a longer time to complete a turnover. An accident of capital, however, is at the same time an accident *of value* because the circulation of capital is nothing but the self-valorization and realization of value. I define accidents of value as *any occurrence that stops or slows down the flow of value* and/or

causes the circuit to leak value. Because value must take material forms, an accident of value can only occur when the specific substance that value has invested itself in breaks. For example, when a machine employed in production malfunctions, an accident occurs because the substance breaks, but it is also an accident of value because production cannot continue as normal and capital cannot assume its next form. Value leaks from the circuit because either the value objectified in the machine is lost when it becomes useless, or when repairing the machine requires an additional outlay of value. Other accidents include: food that rots before it is sold; a train derailment that destroys a stock of commodities; strikes, occupations and work stoppages; and lack of supply of elements of production. These accidents can be planned for and eliminated through various contrivances: food can be frozen or have preservatives added; workers can become good subjects by internalizing capitalist ideology; vertical integration can ensure a steady flow of raw materials so that the means of production and labour-power are always in use. Digital piracy is thus one accident of value among many. This specific accident differs from other accidents, however, because it may turn into a generalized accident.

While a generalized accident of value may initially start in a specific stage, it occurs in all the stages, reverberating throughout the circuit, affecting all the forms of capital; it is indifferent to capital's spatial extension. It is different from the localized accident, which is limited to a particular stage of the circuit and to its real-space location. While a localized accident which leads to a loss of value will affect the entire circuit because less value is realized than under normal circumstances, it does not affect the integrity of the forms and circuit of capital. The examples given above are localized accidents.

In a positive class struggle reading of Marx, the generalized accident is, of course, revolution, when the working class overthrows capitalism by negating itself as a class. This real movement that abolishes capital is necessarily generalized; it breaks free from the tyranny of value, abolishes the commodity form and the need for money, thereby negating production based on capital. Based on my reading of the *Grundrisse*, in particular the "butterfly fragment," I argue that digital piracy has the potential of

becoming a generalized accident of value much like class struggle, but with the difference that it affects only those branches of production that rely on digital commodities and real-time circulation networks. Digital piracy is potentially a generalized accident of value because of the accidentalization of the commodity, which enables commodity-capital to travel in the form and at the speed of electromagnetic waves, and to circulate at absolute velocity.

When material objects are rendered digitally, they become numerical representations that abstract from all content and subsume use-values into the singular “anti-human use-value” of binary code.⁴ The reproduction of digital data is perfect; an infinite number of copies of any digital object can be reproduced without any change, loss or difference in data, which makes a digital copy identical to its original (Vuorinen 2007:29; Betancourt 2006; Manovich 2001:52; Wolf 2000:51).^{5 6}

So far no engineer has been able to digitize value. Use-value is what is accidentalized because value has no independent existence; its social validity is established after exchange and exists only in the capitalist mode of production. Use-value, the qualitative aspect of the commodity, is “conditioned by the physical properties of the commodity, and has no existence apart from the latter. It is therefore the physical body of the commodity itself” (Marx 1976:126). It follows that the commodity is also the material form of value. Because any commodity can express its equivalent value in any other commodity, use-value is the form in which the commodity (re)presents itself for exchange. In effect, use-value is the accident of value in capitalism.⁷

4 Differences between data streams are eliminated and subsumed by the meta-medium of the computer. Any difference between digital objects is quantitative rather than qualitative (Manovich 2001:27-30, 174; Kittler 1999:1-2). Binary code is an anti-human use-value because only a computer that can read it.

5 In real space, while two copies of a material commodity might very well be identical in how they present themselves to perception, they are nevertheless unique because they have unique locations in space and have separate histories. Mechanical reproduction represents the mass reproduction of a series of nearly identical objects. A mechanically reproduced copy is inherently unique because it is bound by the intervals of real space; it occupies a unique location in space and accumulates a separate history from other copies.

6 With electronic reproduction of analog data streams there is a loss of signal on successive generations of copies. Both mechanical and electronic-analog reproductions point backwards to an original or zero-generation object and/or signal (Vuorinen 2007; Betancourt 2006; Benjamin 1936).

7 I should clarify that value does not have any substance; it is not a chemical property that can somehow

I argue that digital data could be the ideal medium for value because binary code is as indifferent to its content as value is to use-value; they are both quantitative rather than qualitative. The problem for capital is that if absolute speed reverses the relation between substance and accident, use-value becomes absolute and independent from substance and value. When use-value can be separated from value the digital piracy accident can occur; the commodity form disintegrates and use-values proliferate.⁸ Although increasing the velocity of circulation promises less dead time of capital and reduces the precarity of the commodity form, with digitization the commodity may break the speed-limit of capital, making capital's existence in the commodity form even more precarious. In short, an effect of the accidentalization of the commodity is the digital piracy accident.⁹ Why and how digital piracy is a generalized accident can be better understood when compared to the limited and localized forms of previous copyright piracy.

Prior to digitization and p2p filesharing networks, the culture industry already faced music piracy. Real-space piracy, however, was an aggregate of the limited and localized accidents of value of non-profit home copying between social networks in close geographical proximity, such as friends, family and school, and industrial scale for-profit counterfeiting (Johns 2009:431-462; Karaganis 2007a:227).

Although commercial piracy is an accident of value to those circuits of capital that produced the original commodity, from the point of view of social capital it is not an

be distilled from the commodity (Marx 1976:177). Value is an abstraction with social validity and becomes a "real abstraction" in the form of money. Use-value could be thought of as a feature of the commodity, but not as the only accident since commodities have particular use-values. While value relies on use-value to be realized, it does not rely on any particular use-value. Value is indifferent to use-value (Marx 1976:155).

- 8 The separation of use-value from value is nearly identical, through inverse, to the separation of exchange-value from value. With the digitization of money, financial derivatives and so on, value can, at the speed of light, self-value itself abstractly and independently from actual value creation (see e.g. Graham 1999; 2000:133-135; Bauman 1998). That Virilio (1997:83; 2007:10-14) considers financial crises as generalized accidents is interesting because they are inherently accidents of value. It is, however, beyond the scope of this thesis to explore this generalized accident in more detail. A juxtaposition of Virilio's generalized accident of finance and a negative crisis reading of Marx on financial capital could be productive.
- 9 The digital piracy accident, like other accidents, can be eliminated or mitigated, which the culture industry attempts to do by implementing anti-piracy measures, such as digital rights management (DRM). I return to DRM towards the end of this chapter.

accident. Value is merely redistributed between different capitalists because the counterfeiter, just like the enterprise whose commodities he duplicates, creates value by absorbing surplus value from wage-labour and produces commodities for exchange. The only distinction between counterfeiting and other types of capitalist production is its legal status and reliance on black-market circulation networks.

Non-profit home copying was a limited accident of value because it occurred in real space. Physical media (mainly cassette and VHS tapes, and floppy disks) had to be physically displaced by people and/or the postal system. According to Biddle et. al. (2002) the main limitation was the latency of the network. Because the copy was physically displaced according to the three phases of the journey, receiving it could take a long time. This accident was limited also because of the quality of re-production, which was low, less durable, laborious and/or costly. (Johns 2009:435-448, 460-462; Biddle et. al. 2002; Leyshon 2001:52). Commercial counterfeiting and home copying were mitigated by copyright holders receiving a share on the surplus value of blank media commodities (cassette tapes, VHS, CDs). The culture industry could also rely on the repressive apparatus of the state to confine piracy to black markets or at least only to countries where copyright protection was lax.

Although the music and movie industries conducted awareness-raising campaigns saying that home copying was killing their industries, the impact of this form of piracy had “limited commercial impact,” and the affected industries rarely took legal action (Biddle et. al. 2002:3-4). Christopher May argues that when non-profit piracy was a limited phenomenon, the culture industries tacitly accepted the loss of revenues and profits it represented (May 2007:53-54). When use-values are accidentalized, however, the limited real-space home-copying accident is transformed in to the virulent and possibly generalized digital piracy accident. After digitization and the advent of the internet, the extent of non-profit digital piracy rivals that of commercial, industrial-scale piracy operations.

The conditions under which various branches of production organize their particular circuits of capital leave them more or less prone to accidents. Before I proceed

with my analysis I give a brief overview of the organization of the circuit of capital in the culture industry, with particular reference to the music industry because digital piracy, as a widespread phenomenon, arguably started in this industry. Digital music piracy is the canary in the coal mine for those branches of production that chose the accident over the substance. It is the most developed form of piracy, in terms of both its extent and in the measures taken against it.

An overview of the circuit of capital in the music industry

From the point of view of abstract labour, the music industry is, in essence, just like any other capitalist enterprise. It consists of

fastmoving, unit-led production, marketing licensing and distribution functions. How much product will sell in which territories, how quickly they can ship, how fast they can re-stock and so on (Janson and Mansell 1998, qtd. in Fairchild 2008:66).

This description has little to do with music, but more to do with a generic, efficient, organization of the circuit of capital. However, the use-value that the music industry and the culture industry at large rely on does matter; a circuit that relies on cultural commodities has more difficulty in maintaining the inner unity of capital.

Most cultural goods are expensive to produce, but cheap to reproduce. In other words, the turnover of capital in which the commodity is originally produced requires considerable investments in both variable and constant capital, while at subsequent turnovers the required quantity of capital advanced is considerably lower. What makes the music industry specifically vulnerable to digital piracy is that only about 10% of music recordings (or for that matter movies and books) recoup their investment. These blockbusters, however, are so successful that they cover the costs of the unsuccessful 90% and generate profits as well (Gillespie 2007b:251; Karaganis 2007a:227; Anderson 2006; Leyshon 2003:537-538). The music industry is thus “characterized by chronic uncertainty” and a desire for predictability about what will be the next big hit (Leyshon 2003:537). Despite years of market research and audience tracking there is simply no

way to know whether a cultural good will sell and recoup investments. Hence,

the mass audience for any particular good is a *hypothesis* constructed from highly fallible marketing techniques...Marketing and market research, genre formulas, star systems, and the growth of media mixes and content franchises (with inevitable sequels and spinoffs) are the default strategies for pushing back against this *uncertainty* (Karaganis 2007a:231, emphasis added).

Test screenings of movies, stress testing of furniture and crash test dummies; these are nothing but ways of planning for the accident that occurs when the substance and/or chain of value breaks. Under these conditions, “producers need widespread distribution systems that can recoup initial investments and control mechanism that can ensure that goods remain ‘excludable’ – capable of being denied to others as they circulate” (Karaganis 2007a:227). The culture industries have traditionally relied on “stable *content formats*, delivered through relatively secure technological channels,” and a business model that structures the “circulation of commodities in ways that prevent widespread secondary distribution, which would undermine primary markets for the goods” (Karaganis 2007a:226).¹⁰ This naturally requires substantial investments in sophisticated logistical networks. Investments are recouped by “continuous turnover of new books, movies, record albums, and programming (Karaganis 2007a:227).

The culture industry's profit and longevity depends upon the exploitation of copyrighted content in various media formats through careful control of networks of distribution and promotion (Fairchild 2008; Karaganis 2007a:255; Leyshon et. al. 2005; Leyshon 2003; 2001; Alderman 2001). Copyright is a subset of intellectual property right (IPR) law, which grants owners certain exclusive rights over intangible assets.¹¹

¹⁰ For example, exhibition (movies, concerts), retail of material goods, broadcasting and subscription services.

¹¹ IPR can roughly be divided into the categories of industrial and artistic. The former refers to the protection of an idea and includes patents, industrial design rights and trade secrets, while the latter refers to the copyright on an expression of an idea. Currently, it is mostly copyrighted artistic works that are digitally pirated, but with the development and subsequent proliferation of low cost 3D printers and scanners, digital piracy would also infringe patents, registered trademarks and industrial design rights. Industrial design rights consist of the configuration of shape/form, pattern and colour in three dimensional forms (Bradshaw et. al. 2010).

Copyright resides in the work from the moment of its creation and is meant to grant the creator an incentive to produce by ensuring that the expression is not reproduced without permission. Cultural expressions are inherently non-rivalrous and non-excludable,¹² which undercuts capital's ability to maximize the realization of value and capital accumulation (Garnham 1990:38-40). When capitalists accumulate capital based on cultural production, they require the legal structures of IPRs to grant a monopoly on the goods. The function of copyright is therefore to impose an artificial scarcity on cultural works for a limited period and for limited purposes (May 2007:17-20, 36-39; Lessig 2001; Vaidhyathan 2001). Copyright is a contrivance to lower the barrier of use-value and facilitate sale in circuits of capital that rely on non-rivalrous commodities. Prior to digitization and the internet, cultural commodities could be parcelled out in limited quantities because the actual expression of ideas and culture were stored in analog and physical media that were (and still are) rivalrous.

The music industry has developed in lockstep with the technological development of content formats and storage media: from vinyl to magnetic tape and digital music on compact discs (CDs), digital audiotape and minidisks. The transitions from one format to the next have been economically beneficial to the music industry as old recordings have been recycled in new formats and without major changes to the supply chain (Karaganis 2007a:235; Leyshon 2001:49-50). Although it makes sense, as I will discuss below, to digitize commodities and rely on a real-time circulation network, the transition to digital content format has been problematic rather than beneficial to the music industry. Because of its speed and neutrality towards content (it does not distinguish between legal commodities and pirated objects), the internet is an extremely insecure distribution network compared to its real-space counterparts; the same content can circulate as commodities or proliferate as digital objects.

Apart from DRM and other anti-accident measures (which I will discuss at the end of this chapter), a way to stay in control of the speed of a real-time distribution

¹² For example, my use of an idea does not rival another's use of the same idea, whereas my use of a car would bar another's use of that car.

network and digitized commodities is to base production and distribution on immediacy. Apple's iTunes Store, Valve's Steam and Netflix are examples of digital distribution platforms that rely on immediate real time to reap the benefits of absolute speed. Before I discuss why capital can benefit from immediate real time, I first clarify what the speed limit of capital really is.

Capital's speed limit

The barriers of use-value, space and (circulation) time that I used to discuss capital's impetus to accelerate can be directly related to Virilio's conceptualization of speed as relative and absolute. Through relative acceleration, capital can overcome the barriers of use-value and space, and lower the barrier of circulation time. The revolution in transportation increased technological speeds and enabled capital to expand its market and subsume geographical space into its spatial orbit, folded the barrier of use-value into space, and through annihilating space with time, the barrier of space was folded into the absolute barrier of circulation time. While relative acceleration lowers the barrier of circulation time, the final barrier can be overcome only when capital accelerates absolutely. When capital circulates at close to absolute velocity the circulation barrier appears as a mere threshold beyond which the promised land of ideal circulation lies. But circulation time is a barrier that capital cannot overcome. The threshold is in reality the speed limit of capital, that insurmountable barrier of real time that capital can only crash into, not overcome, at absolute velocity. What is this threshold?

In the previous chapter I briefly considered immediate real time as a "brief temporal lag" and discussed simultaneous real time as "happening at the same time" and as a "non-time" (pp. 48-49). Considering that a condition for production based on capital is that circulation time must be a deduction from production time, and the moments of capital must be separate in time (Marx 1973:548-49), the two types of real time have different effects on the circuit.

I posit that the limit speed of capital is immediate real time. Immediacy is the threshold because it is a brief temporal lag, even if only a fraction of a second. In other

words, immediacy has duration. At this speed capital's circulation time is above zero. Capital is kept in the dialectic of production and circulation because the condition of circulation time deducting from production time is met. The temporality of immediacy is as close to ideal circulation that capital can get. It makes capital accumulation in a tele-technological context possible, and is the foundation of digital distribution platforms.

At the speed of immediacy, however, capital is perilously close to losing control over its own speed. If capital cannot keep its velocity below its limit, it crashes into the barrier of simultaneous real time. Simultaneous real time is thus the Virilian equivalent of the absolute velocity of capital: non-time = zero circulation time. If simultaneity voids time, circulation time cannot be a deduction from production time. Simultaneity is the reason why accidentalization leads to the digital piracy accident of value. I will now consider the circuit of capital in relation to immediate and simultaneous real time in detail, as well as real time's ubiquity in space.

Digital distribution: immediate real time

In order for capital to move into real time and exploit the absolute speed of telecommunications, the commodity must be digitized. Capital's need for speed, for shorter circulation times to the point when it is reduced to zero, forces capital to exterminate the substantial natural qualities of the commodity form in favour of weightless digital objects, whose only distinguishing features are different file sizes.

Although the digital piracy accident was at first unexpected, considering that digital piracy is now a fact of second life, why would any capitalist choose to have his commodities in digital form? Yet the culture industry wants to "go digital", and some companies are even aggressively pushing digital distribution (IFPI 2010; Tera Consultants 2010; OECD 2009; Pavlik 2008:148).

Digitization is acceleration. In byte-size, the commodity assumes a form, which, like electronic money and credit, is identical to the speed of transmission. In digital form the commodity consists of the electromagnetic waves that are transmitted over fibre optic cables and integrated circuits that comprise digital computer networks. In this real-time

circulation network capital can accelerate up to absolute velocity.

At the speed of electromagnetic waves the expanse of the earth is reduced to nothing. Without having to traverse real space, the time capital spends in the commodity form due to transportation is eliminated. While the relative speed of transportation abolishes distance relatively and reduces the total duration of the circulation of commodities, the generalized arrival of absolute speed voids the period in which commodities migrate and abolishes distance absolutely. Because of generalized arrival, capital in the commodity form is stored on server farms in limited quantities of bits, taking up no space, unlike the material commodities stored in warehouses and competing for space on retail shelves. Capital in digital form has little dead time compared to substantial commodities; it spends literally no time negated and devalued in its commodity form.¹³

Other reasons for capitalists to “go digital” are the same as any reason for rationalization and restructuring: lower costs and higher profits (Pavlik 2008; Kretschmer et. al. 2001; Davis and Stack 1997). Digital rendering is resource conservative, cheap to store,¹⁴ easy to copy and manipulate. A real-time circulation network (digitization and telecommunications), compared to a real space one, can cut overhead costs, collapse supply chains (by eliminating middle men) and provide consumers with nearly unlimited choice and cheaper prices. The market economic benefit of ICTs is to match sellers and buyers quickly at minimal cost in a transparent market (Kretschmer et. al. 2001:420). Circulation costs can be shared with the consumer, who not only initiates and performs the labour of (re)production with their own instruments of labour, but also pays for part of the bandwidth of the generalized arrival of the digital commodity.

Layers of labour involved in the sphere of circulation (e.g. accounting, warehousing, transport and sales) can be eliminated (Davis and Stack 1997:128-129). While circulation labour is socially necessary, it does not add any useful effect to the

13 Being in digital form, however, is no guarantee that the commodity will actually be sold. The barrier of use-value still remains.

14 There is no need to keep stocks of commodities. Countless digital commodities can be produced to order from a single copy located on a server.

commodity and is unproductive of surplus value.¹⁵ Labour such as that of the sales clerk, re-stocking of commodities and book keeping are instead costs of circulation (just like paying rent for storing commodities in a warehouse) (Marx 1978:209-216). Circulation costs related to the formal metamorphosis of capital are therefore *faux frais*, i.e. a deduction from surplus value and make commodities more expensive (Marx 1978:226).¹⁶ Elimination of labour associated with circulation would thus increase the mass of surplus value by reducing costs.

A key advantage of commodities in digital form is that they can be sold above their value, which according to Christian Fuchs (2009b; 2008:171-177) is the value-theoretic mechanism for capital accumulation on the internet. Selling digital commodities above their value is possible because both the use-value (in this case the accidents of sound, image and text) and the material form of the commodity are non-rivalrous. Non-rivalrous commodities need to be produced only once, and can be the point of departure for endless turnovers of capital. The original production of a cultural commodity, such as a movie or an album, requires substantial investments in both constant and variable capital at the first turnover. After the commodity has been produced, the only required labour is that involved in its copying. All subsequent turnovers need comparatively little investment of value in labour-power and means of production. All reproduced commodities however, are sold at the average value¹⁷ of the commodity and market price established during the first turnover; on all turnovers but the original, the value of the commodity is significantly lower than its market price, which leads to more revenues and profits, and a considerable higher rate of profit (see Appendix 1 for Fuchs' example with

15 Keeping in mind the internal contradiction of the commodity, the creation of added or new value must be tied to the creation of a connected useful effect, i.e. use-value (Marx 1976:125-131; 1978:216-217).

16 Transportation, however, is an exception because it adds the useful effect of change of location to the commodity; it is therefore not a cost of circulation, but instead adds value to the commodity. It is a specific branch of production and appears as a "continuation of a production process within the circulation process and for the circulation process" (Marx 1978:229). Nevertheless, with real-time circulation networks even the productive labour of transportation can be eliminated, consequently increasing the rate of surplus value and reducing the average value of the commodity.

17 The value of a commodity equals the value of the constant capital (c) (raw material and means of production), variable capital (v) (labour-power) and surplus-value (s). The average value of a commodity is $c+v+s$ divided by the quantity of commodities produced.

calculations).

In his example, Fuchs considers the reproduction of material commodities (software on CDs and DVDs) which still require investment in variable and constant capital. Reproduction of digital commodities requires even less investment. Digital commodities are cheap to store because they are simply entries in a database; a single digital copy can spawn a million more. The value of a digital commodity is extremely low because the labour it takes to reproduce it is negligible. The value of a commodity is measured in labour time and is therefore in an inverse relationship to the productivity of labour; if productivity is high, the labour time objectified in the commodity is lower (Marx 1976:130-131). The labour time it takes for reproducing a digital commodity is that fraction of second when I click on a link. This labour is even performed for free by consumers. The only value (or cost) transferred to the final product, and therefore the only needed investment, comes from the labour of maintaining server farms and the software that provides the backbone of digital distribution platforms.¹⁸ Overall, the social average necessary labour time is negligible and the average value of a commodity decreases as additional digital commodities are reproduced. If digital reproduction and distribution were the basis for the second turnover in Fuchs' example, the mass and rate of profit would be higher.

Although accidentalizing the commodity form certainly has advantages for capital, the problem of absolute velocity of circulation and of keeping the commodity in its form still remains. In other words, the digital piracy accident occurs when circulation time is zero, when capital breaks its own speed limit. To stay in control of its circulation speed, capital must decelerate so that circulation time is a deduction from production time.

I have argued that immediacy is the speed limit of capital. The circulation of capital can occur in real time if, and only if, it is immediate. With a brief temporal lag the

¹⁸ I write "or cost" in brackets because I am not sure whether the writing of software and maintaining server farms is productive or unproductive labour. While software is certainly a new use-value, if it is made in-house and is used in order to formally convert commodities into money it can also be unproductive.

circuit of capital is still a contradiction of production and circulation, and capital is able to assume and discard the commodity form. A moment of circulation time that deducts from production time is all that capital requires for its continuing existence. When capital circulates according to the immediacy and then to the simultaneity of real time, the metamorphosis of capital would be as close to ideal as possible without undermining its own life process.

For capital to exploit real time, however, the starting point of the circuit must always be commodity-capital. The sale must always occur immediately before the commodity is reproduced through generalized arrival. To illustrate how this works online, I will use the example of Apple's iTunes Store.

The iTunes Store, launched by the Apple Corporation in April 2003, is today the leading digital distribution platform worldwide, the largest music vendor in the United States and commands 70% of worldwide digital sales in music.¹⁹ Since its launch, it has reproduced and sold over 10 billion digital commodities from its catalogue of over 12 million songs, 55,000 TV-episodes and 8,500 movies (Apple 2008; 2010; Reuters 2007).

Although the iTunes Store is not a producer of original commodities and would be a retail store in real space, in real time it should be considered as a point of production as well as exchange.²⁰ The store does not merely re-sell commodities; through generalized arrival digital commodities are produced now-here! With the ubiquity effect of absolute speed, all markets and points of production become tele-local, and are, for all intents and purposes, indistinguishable. When I buy and download something from the iTunes Store, my own computer and house is turned into a point of production and a market at the same time. The non-place of the iTunes Store exists neither "here" on my computer in my apartment nor "there" where the commodity is stored on a server farm. The iTunes Store

19 In 2009 global digital revenues accounted for 27% (US\$ 4.2 billion) of total revenues in the music industry (IFPI 2010).

20 An implication of not producing the original commodities is that Apple does not have to gamble on whether their investment will turn a profit. The circuit of capital of the iTunes Store is therefore less vulnerable to accidents of value, such as digital piracy or changing consumer tastes, than the circuits of capital in the music industry proper.

is ubiquitous in space because it is neither here nor there.²¹ The iTunes Store could just as well be called the iTunes Factory: commodities are produced by tele-labourers that are also the tele-consumers of the store.²²

When I buy something from the iTunes Store, the sale of the commodity and the realization of value occur before the commodity is reproduced. As soon as I have paid and/or clicked on the download link, I immediately start to download and produce the digital commodity. Because it is produced to order and just-in-time, selling time is zero.²³ While a selling time of zero should result in a circulation time of zero, what actually occurs is that the moment of exchange has a brief temporal duration just before the production and actual circulation of the commodity start.

Immediately after the formal metamorphosis occurs, simultaneous real time folds the circuit of capital into the intensive moment of generalized arrival when the digital commodity arrives on my digital device. More precisely, what folds into generalized arrival are the real-space moments of (1) bringing the elements of production together; (2) production; and (3) transportation. The capitalist has already purchased the necessary labour-power and means of production, and the sale of the commodity occurs immediately before capital completes the circuit at absolute velocity. I return to the effect of simultaneous real time on the circuit of capital in my discussion of digital piracy.

If the moment of the sale can be inserted immediately before capital's circuit is compressed, capital has a circulation time, even a turnover time, which is as close as possible to its ideal of zero. If the moment of exchange occurs, the commodity is kept in

21 However, Apple treats the iTunes Store as if it were in real space. It has a presence in only 22 countries worldwide. This is mainly due to licensing rights for the commodities the store carries, and because it needs payment options specific to the country it operates in. Although iTunes can exploit the ubiquity of real time, Apple is forced to treat it and interpret real time according to the extension of real space.

22 Part of Apple's productive-capital – the labour process – is also accidentalized.

23 Digital distribution platforms relying on generalized arrival is a near perfect example of the post-Fordist production. These digital factories maintain no substantial stock of raw materials or finished products. The digital objects stored on servers are just part of a sophisticated logistics and information management system. The commodity is produced to order and just-in-time directly to the consumer and the decision to produce always comes after and in reaction to actual demand. The iTunes Store allows the consumer to customize music (re)production; the consumer does not have to buy an entire album, but can choose individual songs from different acts. It is a hyper-flexible and customizable form of production. With some modifications, the iTunes Store could be a particular expression of what the autonomist Marxists refers to as the social factory.

its form and its function of being bought and sold can be fulfilled, and capital can therefore transform into money. Thus to circulate in real time, the circulation of capital must start with the commodity form.

The iTunes Store and other digital distribution platforms must function according to the circuit of commodity-capital: $C' - M - C \dots P \dots C'$.²⁴ There is an important difference between the format circuit of commodity-capital and the actual and particular circuit that the iTunes Store represents. In the former case, the circuit starts with an actual commodity impregnated with surplus value. In the latter case, the circuit starts with an imagined commodity in the mind of the consumer and its representation in the iTunes Store's shopping cart. The circuit therefore starts with an imaginary commodity-capital (C'), and the consumer realizes its value before s/he starts the production of the actual commodity.

While capitalist enterprises operating on the basis of immediate real time function according to the circuit of commodity-capital, the actual formula of the circuit must be re-written to reflect generalized arrival. Telecommunications must be considered in relation to the circuit of transportation and production proper because the iTunes Store's circulation network relies on the tele-foundations of real time. Although one of the means of communication, telecommunications and digital computer networks are anomalies in Marx's theory of circulation because they are based on generalized arrival.

According to Marx, the transportation industry produces the commodity of "change of place itself," which is "inseparably connected with the transport process" (Marx 1978:135). The transportation process is the production process. Consumption of the change-of-place commodity is therefore identical to the production process. In the branch of transportation, the production process does not leave a separable product from production itself. Stating the obvious in relation to transportation, Marx writes that the "quantity of products is not increased by their transport" (1978:226). Although his comment seems unnecessary, Marx is pointing out that the form of the circuit is different

²⁴ Although the store functions according to the circuit of commodity-capital, from the point of view of Apple, the circuit of the iTunes Store starts with money-capital. Apple has to invest in development of the software, server farms, bandwidth, and labour for maintaining the store.

from other productive circuits. The circuit of capital in transportation is $M - C \dots P \dots M'$; productive-capital is directly converted into money.

At the level of appearance, telecommunications is nearly identical to the transportation branch of production because something changes location. A computer file that was previously not on my computer appears on my hard drive after telecommunications has produced its useful effect. Based on my discussion of the real time of telecommunications in the previous chapter, I argue that the useful effect is radically different from the change of place; the useful effect is the collapse of space and time. Telecommunications puts everything in electromagnetic proximity; it makes people, places and things co-present in time. The key difference between telecommunications and transportation, however, is the generalized arrival of information.

Because generalized arrival can be described as copying or proliferation (pp. 51-53), those circuits of capital that rely on telecommunications for distribution will in some cases not only produce a product separable from the production process, but may also increase the quantity of products. With telecommunications, the quantities of products are increased by generalized arrival. This statement, however, must be qualified.

In the case of broadcasting or a telephone call, the product is the event, which is “increased” by multiplying it by the number of tele-viewers or callers (pp. 46-47). Unless it is recorded, however, no product remains when the broadcast or telephone call ends. In the case of the internet the quantity of products increases as almost every interaction between remote servers and computers creates copies of the data transmitted.²⁵ Any circuit of capital that relies on the internet for its transmission of commodities will have a separable commodity. The formula must accordingly be written as $M - C \dots P \dots C' - M'$, and the circuit of capital in immediate real time as $C' - M \dots P \dots C'$. Because generalized arrival compresses the third and second stages, and part of the third stage into an intensive moment, the circuit must be rewritten as $C' - M \dots GA$, where GA represents

²⁵ Fax machines, like the internet, is an example of telecommunications increasing the quantity of products. With the fax machine, however, the generalized arrival of information results in an imperfect copy.

generalized arrival into which the movements of $M - C$ and P are compressed.²⁶

Another implication of generalized arrival is that hypertrophic digital data appears to be the perfect medium for self-valorizing value. Although the surface effects of binary code appear as qualitatively different use-values, binary code is quantitative, just like value and money. The generalized arrival of digital data is tautological: the immediate result of reproduction is an increase in information and not a change of form. This material tautology is potentially of enormous benefit to capital: digital commodities require minimum storage and nearly no upkeep because the additional copy does not exist until it arrives onto the digital device of a consumer. Digital data appears to be produced *ex nihilo*, with almost no expenditure of living and dead labour.²⁷

The key to accumulation in real time is to have the moment of exchange immediately before production of the commodity, i.e. drive production by demand rather than supply and realize value before producing the object. Immediacy keeps intact the commodity form and the dialectic of production and circulation, and therefore the universal form of capital. With immediacy, capital, just like Hegel's Concept, metamorphoses from its universal to particular forms in no time, close to the "speed of thought." Immediate real time, together with the other digital advantages discussed, can therefore explain why digital distribution platforms can be successful and why digitization is so attractive to content distributors.

26 In this case stage 1 ($M - C$) does not directly represent the purchase of labour power and the means of production, but the bringing together of the subjective and objective elements of production.

27 A critique of the argument that the digital is the ideal medium for capital can be found in Michel Betancourt's article "The Aura of the Digital" (2006). He argues that the digital is the "the site of a specific reification dramatizing an underlying conflict between production and consumption within capitalism itself -- that is, between the accumulation of capital and its expenditure. By enabling the fantasy of accumulation without consumption, digital technology becomes an ideological force reifying the conflict between the limits imposed on the value of capital [sic!] via expenditure and inflation, and the demand implicit in the capitalist ideology of escalating value... The aura of the digital upsets this dialectic by reifying only one side of the construction -- the illusion of production of capital without its necessary consumption. The aura of the digital is thus a symptom of the structure of a pathological capitalist ideology becoming realized as a fantasy of digital technology without regard for the illusory nature of this transfer, or the reality of the expenditures required in the creation of the digital itself." See also Betancourt (2010). Betancourt's critique is interesting, but beyond the scope of this thesis.

Digital piracy: simultaneous real time

Only a minority of internet users chooses the iTunes Store and other digital distribution platforms as a source of digital use-values; the majority elects to pirate them instead. According to the International Federation of the Phonographic Industry (IFPI 2009; 2010), while global digital revenues in the music industry has grown from a negligible percentage in 2003 to 27% in 2009 (a growth of 940%), the great majority of music online is pirated; the IFPI (2010) claims that approximately 95% of all music files online are pirated.²⁸ In Spain, an estimated 1.6 billion songs were digitally pirated in 2008. Compared to only 2 million legal downloads, the ratio of purchased to pirated digital music is 0.1% (IFPI 2009:22). The US media market research company Big Champagne estimates that the rate of the paid music download market to digital piracy is one to ten. While digital piracy of video files (both movies and TV shows) is much lower compared to music, it is growing rapidly (Futurezone 2010).

The reason why the rate of digital piracy in the music industry is higher than in the other culture industries can be explained by the storage of digitized music on CDs and the invention of the mp3 file format. The music industry has profited from and developed alongside the invention of new storage media and content formats. The transition from the analog LP album to digital audio on CDs was a massive success. Because the music industry could simply re-sell old music in a new format, requiring very little outlay of capital, digitizing music proved to be extremely profitable when consumers replaced their LP collections with CDs. The transition from analog to digital, however, was also an accident. The CD was an unprotected content format that put millions of copies of ready-to-rip music files in the hands of consumers, who became content providers due to the internet (Karaganis 2007a:235; Leyshon 2001:49-50; Alderman 2001). The unexpected effect of CDs was the digital music piracy accident, but it could not occur until the mp3 digital audio encoding format was invented.

28 This figure is likely exaggerated by the IFPI in order to pressure governments to adopt legislation favourable to the music industry. A study on music behaviour among young people (14-36) in the UK has a much lower percentage; in the average mp3 collection of 1770 tracks, 48% were not paid for (BMR 2008).

The mp3 was invented by the Moving Picture Experts Group (MPEG), a working group formed by the International Organization for Standards (ISO).²⁹ That a standard-setting body was behind the mp3 is significant. From the very beginning, the mp3 was designed as something to be used by anyone and to be compatible across diverse digital technologies. Development of the mp3 started in the late 1980s and was standardized in 1991, a time at which both bandwidth and storage was limited. In their design, MPEG took into account the limitations of the then technological context. Using the method of lossy compression³⁰ for encoding music, MPEG managed to compress audio files by a factor of twelve or more.³¹ With a size of only 3-4 megabytes, the mp3 was much smaller than other audio formats and took up considerably less space and bandwidth than video.³²

Music in general and the mp3 in particular had few technical requirements for digitization, reproduction and display compared to movies or the inferior reading experience of eBooks on the computer screen. Music in the mp3 format was therefore the perfect object for digital piracy in a low bandwidth and storage environment (Fairchild 2008:55-56; Gillespie 2007b:41; Karaganis 2007b:260-261; Sterne 2006; Leyshon 2003:535-540; 2001; Alderman 2001). Digital music piracy was a *fait accompli* when software that could rip and convert music from CDs into mp3s was developed; *Napster* and other p2p networks were (and are) simply improvements in the efficiency of indexing, searching and transferring of digital files over applications like websites, e-mail and instant messaging.

29 Mp3 is short for MPEG-1, Layer 3.

30 Lossy compression is a method for encoding data that “loses” some data to reduce the size of a digital file. Although lossy compression yields a file different from the original, the compressed file will typically retain enough data to be useful. Examples of lossily compressed file format include mp3 (audio), jpg (image) and mpeg-1, 2 and 4 (video).

31 For example, a three-minute stereo CD file is roughly 30 megabytes in size; its mp3 equivalent is only 3-4 megabytes. The compression is, in essence, a phenomenological trick considering that sound is a form of perception of the phenomenon of vibrations. The file format is designed to eliminate the frequencies that a healthy human ear cannot hear, i.e. it exploits the natural limitations of the auditory perception of the human body. Sterne argues that the “mp3 plays the listener” (Sterne 2006:835, 828, 832-836).

32 Digital piracy of other use-values did occur. Files were transferred through bulletin boards systems (BBS) and chat-rooms, but since internet connections at the time were dominantly 56k modems, the only things that could be transferred were low-resolution pictures, book and video games, and software that could fit onto the 1.4 megabyte floppy disk.

Arguably, the invention of the mp3 was the key invention of digital music piracy because it was “perfectly designed for illegal file-sharing” (Sterne 2006:828) and “for massive exchange... and massive accumulation” (Sterne 2006:838). Its “shape and function [was] skewed towards free circulation, not defiantly, but by design” (Fairchild 2008:56). In a Virilio-like argument, Jonathan Sterne writes:

If one is looking for the cultural origins of the promiscuity among illegal file-sharers, one needs look no further than this founding moment. The possibility for quick and easy transfers, anonymous relations between provider and receiver, cross platform compatibility, stockpiling and easy storage and access – all were built into the MPEG form itself long before the age of Napster, Gnutella, Hotline, iTunes and Rio (Sterne 2006:829).

Nevertheless, the digital music piracy accident unexpectedly cropped up after the advent of the mp3 and p2p networks.³³ It was truly an accident that cropped up unexpectedly on both the inventors of the mp3 and the music industry (Alderman 2001; Mann 1999). In an interview with Leonardo Chiarglione, the coordinator of MPEG during its initial years, Charles C. Mann (1999) writes: “Nobody at MPEG realized how quickly the Net would become ubiquitous. Or how quickly personal computers would become cheap and powerful enough to use MP3s. As a result, the inventors of this technology were as surprised as everyone else by what MP3 software would be used for, and by who would use it.”

Digital music piracy is considered to be the “canary in the coal mine” for how digital piracy will unfold in other branches of production that accidentalize their commodities (Gillespie 2007b:40). While eBook piracy, particularly of science-fiction (Doctorow 2006), has occurred for a long time, it has not been widespread because of the inferior experience of reading on computer screen compared to a physical copy. With the proliferation of eBook readers (e.g. Amazon’s Kindle, Chapter’s Kobo, Sony’s PRS-505

³³ The digital music piracy accident was truly an accident that cropped up unexpectedly on both the inventors of the mp3 and the music industry (Alderman 2001; Mann 1999). Digital music piracy was an unintentional effect of the mp3. Interviewing Leonardo Chiarglione, the coordinator of MPEG during its initial years, Charles C. Mann (1999) writes: “Nobody at MPEG realized how quickly the Net would become ubiquitous. Or how quickly personal computers would become cheap and powerful enough to use MP3s. As a result, the inventors of this technology were as surprised as everyone else by what MP3 software would be used for, and by who would use it.”

and even Apple's iPad) that can more closely approximate reading a traditional book, digital piracy in the publishing industry is likely to increase (IFPI 2010:22; Spring 2009; Striphas 2006).³⁴ With proliferation of low-cost 3D printers and scanners, digital piracy is likely to affect branches of production even beyond the culture industries.³⁵

Although the rate of digital piracy to online commodity exchange has yet to reach 90% in the movie and software industries, with increasing bandwidth and storage no longer being a constraint, digital piracy in these industries are catching up to the music industry. For example, Business Software Alliance (BSA 2009) estimates that in 2008, 41% of the one billion computers in existence worldwide run pirated software.³⁶ The MPAA estimated that digital piracy costs the worldwide motion picture industry US\$ 7.1 billion.

The following anecdotal evidence can also give an indication of the extent of digital piracy in the movie and software industries. David Cameron's blockbuster movie *Avatar* was downloaded over 11 million times in DVD-quality over the Bit Torrent protocol in just one month between February and March 2010 and the Blu-ray version of the movie (at 22 GB) was downloaded 200,000 times in the first four days of its release (Ernesto 2010a; Ernesto 2010b). The 20th Century Fox movie, *X-Men Origins: Wolverine* was downloaded 100,000 in 24 hours upon its pre-release online April 2009 (IFPI 2010:20). The final season premiere of the FOX show *Prison Break* was downloaded 1.14 million times in April 2009, a figure on par with the number of actual TV viewers in the 18-49 age bracket (IFPI 2010:22). The Electronic Arts computer game *Spore* was downloaded approximately 1.7 million times in the last four months of 2008 (Ernesto 2008).

I argue that the reason digital piracy is widespread and dominates commodity exchange is that digital piracy relies completely on simultaneous real time. Immediacy is

34 Torrentfreak compared the Bit Torrent download numbers of six bestselling books in the business category a week before and a week after the launch of the iPad. Torrentfreak found a significant increase of 78% average growth in downloads after the iPad had launched (Ernesto 2010c).

35 Currently 3D printing is mainly used for rapid prototyping, architectural models, small spare parts, action figures of anime and World of Warcraft characters, and moulds for jewelry.

36 BSA (2009) does not specify the rate of digital piracy in their report. The percentage of 41% therefore includes commercial and non-profit physical and digital piracy.

simply slower than simultaneity. On a phenomenal level the human brain cannot register any real difference between the two forms of real time, however, the actual moment of exchange has duration.

With torrent-files, direct downloads (from webblockers or FTP servers) or streaming, there is no interruption by the moment of exchange.³⁷ Although the interaction of starting a download is the same whether this labour takes place in the iTunes Factory or in the Pirate Bay, the former comes immediately after a purchase, typically using a credit card, PayPal or some other form of internet check-out. Pirating a use-value, however, simply consist in searching for the content and/or clicking on a link.

From the point of view of the consumer, the duration of the sale appears as an inconvenience: an account must be registered, input fields must be completed and a method of payment must be authorized. Even though the moment of exchange becomes shorter after the initial setup, in most cases it takes less effort and less time to just download the desired file from a p2p network or a weblocker.³⁸ A study on why Australians pirate found that convenience was as much of a motivation for pirating as cost and that most people would in use a legal service if it were cheaper than the currently existing options and as convenient as Bit Torrent (Ramage 2010).

From the point of view of capital's circuit, simultaneity is by default quicker than immediacy; the latter is capital's limit speed. The reason that digital piracy exists is because of simultaneity. As soon as use-values are accidentalized, use-value leaves value behind, escapes the orbit of capital at absolute velocity and thus suspends circulation time. Accidentalization leads to the digital piracy accident (if it can be digitized, it can, and will, be pirated); simultaneity is the wall of real time that capital crashes into at the speed of electromagnetic waves.

37 Although the stream may be interrupted by advertising prior to or during playback, and torrent trackers and webblockers might have advertisements, which is one way in which digital piracy can be made part of the circuit of social capital is through the audience commodity.

38 In some cases the process can even be automated. For example, by using a RSS (really simple syndication) feed of torrent files together with a Bit Torrent client the downloading of new music or the TV shows I follow require no further input from me than just making the initial setup (see Ernesto 2006).

Another reason for the dominance of digital piracy online is that the internet was designed to work on the principle of generalized arrival. The invention of the internet, or more precisely the series of inventions from packet switching to TCP/IP, was also the invention of the digital piracy accident that unexpectedly cropped up years later in the late 1990s. Tarleton Gillespie writes that “the idea of transmitting perfect copies of authored work was by no means the invention of peer-to-peer file-traders, but was crucial to the earliest notions of what the network would be for” (2007a:33).³⁹ The internet is, in essence, an extremely cheap and effective copying machine and is designed to maximize the distribution of information (Barbrook 2005; Doctorow 2004:18-19; Kittler 2004:252). With the digitization of the accident of sound and image, increased bandwidth and storage and processing capacity of servers and personal computers, the former communications network transformed into a distribution network for rich media content.

The principle of the internet is to be neutral to its uses and to the information transmitted over the network. For example, the internet router is indifferent to the content of the packets it sends to its intended arrival.⁴⁰ Generalized arrival together with network neutrality has made digital piracy the default setting of the internet. Indeed, free exchange of digital data was firmly embedded in the technology of networked computing (Geise 1996). After the accident, the culture industry has struggled to change this default exchange setting from “free” to “commodity”, in particular through DRM, which I will discuss later.

I now discuss how simultaneous real time impacts the circuit’s three stages, the spheres of production and circulation, and capital’s forms. Although the digital piracy accident occurs and can be located in the third stage of the circuit, it becomes generalized as it reverberates throughout the circuit, disintegrating both the particular and universal forms of capital. With simultaneity, capital reaches absolute velocity. All the stages of

39 The initial problem that tele-computing tried to solve was limited processing capacity. In order for a remote computer with higher processing capabilities to run a specific program, algorithm or calculation and subsequently return the result, a requirement was that perfect copies of digital data had to be transmitted (Gillespie 2007a:33; Hafner and Lyon 1998).

40 Network neutrality is currently under attack by, among others, copyright owners who want the network to discriminate between commodities and pirated objects. Internet traffic management is an example of an anti-piracy measure that makes dromological sense (see Appendix 4).

capital are bypassed because no functions are fulfilled. All that remains is generalized arrival, an intensive moment of non-capitalist exchange and production, and in the case of streaming, also consumption. Uploading and downloading, production and exchange are abstracted into the “labour” of clicking on a link.

1. Impact of absolute speed on the stages of capital and the spheres of production and circulation.

Marx argued that the circulation of capital proceeds in space and time. In Virilio’s terms, the circuit of capital is conditioned by and can be interpreted according to the real-space intervals of extension (space) and duration (time). The stages of the circuit are successive in time; they are discrete events, each with a particular duration and “here and now”. While capital’s spatial moment is important for determining the duration of its stages, the temporal unfolding of the overall circuit according to extensive time is vital for capital’s existence.

Although extensive time is chronological, the circuit does not have to start in stage 1 and proceed clockwise to stage 3, even though under normal circumstances the circuit will start with the capitalist advancing money as capital to purchase the elements of production. It does not matter whether the starting point is money-, productive- or commodity-capital, or if the stages are not clockwise. For example, the procession of stages could be production (2), purchase (1) and then sale (3).⁴¹ This would still be a successive unfolding of the stages, but with the order changed.

The temporality of the circuit is a condition for capital’s existence for two interrelated reasons. First, the sphere of circulation must have duration; circulation time must be a deduction from production time. Second, as Marx argues in the “butterfly fragment,” a presupposition for production based on exchange value is that the stages of capital’s circuit must be “situations that are separate in time” (1973:548). Because of my

⁴¹ For example, if the commodities could not be transported at first turnover, the capitalist would have to borrowed credit in order to keep production going and sell the commodities of two turnovers in the second turnover.

discussion of immediate real time, however, Marx's argument must be altered: "in real time the third stage must be prior to and separate in time from the rest of the circuit."

While capital circulates in real space, the temporal conditions of capital are always met. Although space is less important than time in guaranteeing the integrity of the circuit, the extension of real space guarantees that the stages of capital and the sphere of circulation are separate moments. Although speed folds space into time, in real space the velocity of capital cannot void its spatial moment because capital must be physically displaced as matter. In real space, the maximum velocity of circulation is the relative speed limit of escape velocity. The highest possible velocity of circulation, however, is limited and is equal to the speed of the fastest dynamic transportation vehicle.

Until the advent of the telegraph, communication and transportation were synonymous circulation networks and had equal speed because the message could only travel as fast as the messenger. With the telegraph the message could travel faster because it was separated from the messenger; communication and transportation became separate spheres of circulation with different maximum speeds (Graham 2006:88). Although the speed of communications is faster than the speed of transportation, very few commodities can be transmitted as electricity. It is not until tele-technologies and digitization were unified in digital computer networks that capital, in all its forms, can accelerate up to absolute velocity. With the accidentalization of substances, the means of communication and transport re-converge and the circulation network of communication starts to subsume transportation.⁴²

42 The bifurcation of circulation network of capital and gradual re-unification bears a resemblance to Kittler's periodization of discourse networks. For Kittler a discourse network is constituted by a network of technologies that enables a culture to select, store and process knowledge (Galloway 2004:22). Kittler's periodization of history is divided into three discourse networks of 1800 (the monopoly Gutenberg technology), 1900 (analog media of gramophone, film and typewriter) and 2000 (the monopoly of digitized information and fibre-optic networks) (Kittler 1999). Capital's circulation network, which enables capital to move, metamorphose and accelerate, has undergone a similar change. Prior to the telegraph and electricity, transportation was the dominant circulation network because everything moving in real space was material. Matter had monopoly; the message was tied to the messenger. With the telegraph the monopoly of matter breaks down. The message could be separated from the messenger as information; communications emerges as an independent circulation network from transportation. After digitization, information in digital form appears to form a new monopoly and the circulation network of transportation is gradually folding into communications.

As soon as capital circulates in the real time of telecommunications, the circuit is conditioned by and must be interpreted according to the third interval of light. That is, capital circulates according to the limit of absolute speed. As I discussed in the previous chapter the light interval explains the “distance” and “duration” that is voided by absolute speed. Being and acting “at a distance” (in our case tele-production and exchange) can be explained only in terms of the speed with which they occur. With telecommunications capital does not proceed in time and space; it is exposed by the light of absolute speed.⁴³

First, absolute speed voids the spatial moment of capital in favour of ubiquity. Space no longer divides and separates the stages of the circuit, and cannot be the order of co-existence. Mediated by tele-technologies, the stages occupy the same place or, what is really the same, they are everywhere at once. The stages are in electromagnetic proximity, i.e. the circuit is ubiquitous in space (tele-present) and no longer has a spatial extension. All markets and points of production become local, or rather tele-local, and are for all intents and purposes indistinguishable from each other. The point of production is the market and vice-versa, and they are located neither here nor there.

Second, the temporality of circulation is voided by the intensity of simultaneity. The time of duration is replaced by the present moment. Just as absolute speed reduces the three phases of physical displacement into a continuous and instantaneous arrival, the stages of capital occur at the same time. If capital could proceed in simultaneous real time, it would not circulate, but rather expose itself as the singular event of an interaction with the computer; purchase, production and sale would appear as the same. In the case of streaming, even consumption would be indistinguishable from production and circulation.

What really happens, however, is the digital piracy accident of value. The stages, which were successive in time and were spatially removed in real space, occur simultaneously and in ubiquitous electromagnetic proximity in real time. Neither space

⁴³ Virilio uses the term exposure in its photographic meaning as the amount of light that falls on a photographic medium in that instant when a photo is taken. When he deploys the term, he uses it to describe an experience of a temporality in which phenomena are lit up like a photographic medium (James 2007:39).

nor time separates the stages of the circuit. The “here and now” of the circuit’s stages occur “now-here!” The entire circuit is compressed into the intensive moment of generalized arrival.

To some degree there is very little that distinguishes the act of purchasing a digital commodity from digital piracy. The copying of a digital data through generalized arrival in both cases occurs immediately after the interaction of clicking on a link to download. The vital difference between digital distribution and piracy is, of course, whether the moment of the exchange, the commodity form and exchange value mediates this interaction. In the case of digital distribution platforms relying on the technological immediacy of real time, the moment of exchange always interrupts before production and distribution. With digital piracy, the inherent simultaneity of the internet, however, compresses the various functions associated with purchase, production and sale to a mere interaction with a digital device.

Steve Jones argues that with the internet the “loci of exchange” (both the act and actual place of exchange) is no longer under the control of the music industry (2002:220). Historically, the cash register in real space was the location at which money confronted commodities and the latter passed into possession of the consumer. Jones argues that the “loci of exchange” are disrupted by the “near instantaneity of digital distribution (Jones 2002:221). In Virilian terms, the loci of exchange in real time occur “right now!” and multiply as digital objects proliferate. The place and point of purchase of human physical proximity in real space is substituted by the electromagnetic proximity between computers and humans. The moment of exchange is bypassed and therefore eliminated when the elements of production are brought together, which happens at the exact moment that the pirate clicks on a download link.⁴⁴ When use-values are accidentalized and proliferate according to generalized arrival, it is extremely difficult for capitalists to control or even have “loci of exchange.” In Marxist terms, digital piracy makes it difficult

⁴⁴ With digital piracy the elements of production are the binary raw material, networked digital devices and the digital pirate.

to impose the commodity-function of buying and selling on the consumer.⁴⁵ It is not impossible, however, to control the moment of exchange and impose the commodity form, as my discussion of immediate real time has demonstrated.

In real time proper, nothing remains of the specific and previously successive movements of purchase, production and sale; they are always already eliminated and compressed into generalized arrival. While digital piracy initially occurs in the third stage of the circuit because the use-value must have been originally produced before it can be pirated, the accident reverberates throughout the circuit because digital piracy is also a form of production and distribution as well as exchange.

In order for something to be productive, a useful effect must be created. In the case of digital piracy the useful effect is the additional copy of a digital object, which appears on my digital device after generalized arrival. Digital piracy is therefore a mixture of the transportation industry's production of "change of location" and a normal production process that produces a quantity of particular use-values.⁴⁶ What distinguishes the production process of digital piracy from a capitalist production process is that the former does not contain a valorization process, which is what makes the capitalist mode of production unique among all other modes of production. A capitalist production process must be a unification of a valorization process and a particular labour process (Marx 1976:283-306). Digital piracy is thus a non-capitalist production process, or simply a labour process.

45 It should not come as a surprise that it is retail stores in real space that have seem to have been hit the hardest by digitization (both digital piracy and digital commodity exchange). In 2004, Virgin Megastore in Vienna (the largest music retailer in the city) went bankrupt, and management cited piracy as a reason alongside heavy competition (Fuchs 2008:158). In 2010, the movie and video game rental chain Blockbuster filed for bankruptcy in Portugal, closing down 27 stores nationwide, and blaming digital piracy as the reason (Faria 2010).

46 If digital piracy is a form of production, it must be labour. The particular labour of digital piracy, however, cannot readily be distinguished from other types of computerized concrete labour. Virilio writes that the interaction surpasses any concrete action in real space (2000:127). This is very similar to Hardt and Negri's argument that with "the computerization of production today, however, the heterogeneity of concrete labour has tended to be reduced... The labour of computerized tailoring and the labour of computerized weaving may involve exactly the same concrete practices – that is, manipulation of symbols and information... Through the computerization of production... labour tends toward the position of abstract labour" (2000:292). In our case, there is no difference between particular labour involved in the sphere production from the particular labour involved in circulation because these occurs simultaneously through a single interaction.

Without a sphere of circulation in which value can be realized, production based on exchange value gives way to production based on use-value. The digital pirate's motivation is the use-value, the surface effects of the binary code that she downloads or streams. If production is based on use-value, there is no need for a sphere of circulation in which value is realized and commodities circulate. With digital piracy, the historically specific sphere of circulation of the capitalist mode of production is replaced with the transhistorical sphere of consumption as the antithesis of production.⁴⁷

2. *Impact of absolute speed on particular forms and universal form*

Because completion of the stages of the circuit occurs by capital fulfilling the functions corresponding to its forms and thereby metamorphosing, the elimination of the stages must also impact capital's forms. When circulation time is suspended, the sphere of circulation is also suspended. Because capital changes from the commodity form into money and back again in the sphere of circulation, the particular forms and, considering the universal form of capital is the unity of the particular forms, the universal form of capital must disintegrate if capital's moment of circulation no longer occurs. I now explain how the forms actually disintegrate.

Absolute speed disintegrates all of capital's forms because the corresponding functions are compressed into the singular function of generalized arrival. While all of the forms disappear, the commodity must disintegrate first; it is the immediate result of the process of production and the first mode of existence of value. The commodity form disintegrating first is simply another way of stating that the third stage of the circuit is the first stage to be bypassed in simultaneous real time.

I conceptualize digital piracy in the following way. In the first turnover, when the original commodity is produced, the capitalist invests a given sum of value in money form to purchase the necessary subjective and objective elements of production, which

⁴⁷ On the dialectic of production and consumption, Marx writes argues that "Production mediates consumption; it creates the latter's material; without it consumption would lack an object. But consumption also mediates production, in that it alone creates for the products the subject for whom they are products" (1973:91, see also 1973:90-94).

are then set in motion in the form of productive-capital to produce a new use-value in which value has been valorized. Suppose the movie's use-value becomes available on p2p networks before it is released.⁴⁸ If we assume that everyone chooses to pirate the movie instead of purchasing it when it becomes available for exchange, then the value in the form of productive-capital would not be able to transform into the commodity form. The use-value is produced, but without the commodity cocoon it takes off as a swarm of instant butterflies.

If the commodity form disappears, value does not come into existence, and subsequently cannot be realized because the function of buying and selling cannot be fulfilled. The result is that it is impossible for capital to assume the money form. It is not the case that money form disintegrates; it is never confronted with any commodity and therefore cannot perform its function as means of payment or purchase. The form of productive-capital is eliminated because it is the digital pirate, not the capitalist, who brings together and sets into motion the elements into production to produce the extra copy. The overall result is that the circuit of capital that gave birth to the original commodity bleeds surplus value; if no commodities are sold the particular circuit in question would also vanish because capital would not be accumulated and the capitalist would subsequently not be able to restart the circular process (though credit could keep the circuit going artificially). In the context of digital computer networks, the commodity form is the circuit of capital's equivalent of the Death Star's exhaust pipe. The commodity must be kept in its form in order for capital to assume and discard its forms and thereby maintain its universal form of unity-in-process.

In short, digital piracy occurs when capital breaks its own speed limit and achieves absolute velocity. Simultaneity voids the time capital spends in circulation and eliminates the latency between capital's metamorphoses, which Marx argued in the “butterfly fragment”, are presuppositions for the continuing existence of capital. Without latency the various moments and forms of capital are simultaneously exposed by the light

⁴⁸ Use-values can escape the commodity form and proliferate in many different ways: accidents can be copied from numerous sources online and from closed networks and embedded devices etc. and analog signals can be recorded and/or digitized where it is received (the “analog hole”).

of speed; all that remains is an intensive moment of generalized arrival that compresses the circuit of capital into a dot with no discernible stages, form or spheres. This compression is “the same as to suspend the necessity of exchange, of money..., hence capital itself” (Marx 1973:629). The universal form of capital thus vanishes together with the commodity form and its other particular forms. As I discuss below, it is in this context that the anti-accident measure of DRM is necessary because it attempts to keep the commodity in its form and ensure the continuing circulation of capital.

The previous capitalist functions and corresponding forms of money, commodity and productive-capital are replaced by a singular economic and material form. This economic form has been referred to as the high-tech or information gift (see. e.g. Barbrook 2005) or a communications commons (see. e.g. Dyer-Witheford 1999). Taking a cue from Alexander Galloway I argue that the form is the digital object, which is simply “any unit of content” (2004:73-74).

The digital object is a composite of, or can at least take on the functions of all the previous economic forms of gift, commons and commodity. It is not a given that the digital object is a gift. It can in certain circumstances be exchanged as a commodity, just as readily as it can be gifted. Because the exchange of pirated digital objects occurs in electro-magnetic proximity, the exchange is relatively impersonal, anonymous and atomized, just like the exchange of commodities. Pirated digital objects are thus “more like quasi-commodities than like gifts” (Leyshon 2003:554).⁴⁹

What is peculiar to the digital object is that it is inherently non-scarce. Because the pirated digital object is not a form of value, it does not circulate like commodities; instead, they proliferate. One copy can turn into a potentially infinite number of digital objects because every copy of a digital object is raw material for yet another copy. The hypertrophy of digital data create problems for capital in addition to the leakage of

49 I do not believe that digital piracy or for that matter sharing of non-copyrighted works constitute gift giving. Real time is an anti-human environment where everything is in electromagnetic proximity. In such an environment the obligation to reciprocate – the spirit of the giver – is difficult to pass on for the very same reasons that the typewriter could not convey the love to Minnie Tipp that the unnamed poet in Richard A. Berman's “Lyre and Typewriter” had poured from his *Geist* into his romantic, erotically charged and beautiful handwritten poems (Kittler 1999:1975-178).

surplus value: tele-present points of production and exchange proliferate together with the digital objects.⁵⁰

This proliferation could only have happened after powerful personal computers and broadband became ubiquitous consumer commodities. In relation to digital piracy or for that matter digital distribution and other types of tele-labour, these commodities are instruments of production. According to Marx, the widespread distribution of instruments of production has implications for the distribution of use-values:

[B]efore distribution becomes the distribution of products, it is: (1) the distribution of the instruments of production, and (2) which is a further specification of the same relation, the distribution of the members of society among the various types of production... The distribution of products is evidently only a result of this distribution (1973:96).

Although the instruments of production were distributed as products in commodity form and through commodity-exchange, the effect on the subsequent distribution of products nevertheless follows from this initial distribution. The relations of production that members of society are subsumed under are a relation between “peers”, alongside the relation between workers and capitalist.⁵¹ The hierarchical client-server relationship that discriminated between who could be information providers and who could be recipients is subverted by the distribution of tele-technologies and computers. Internet users can both send and receive information i.e. be client and server simultaneously (Fuchs 2008:164; Gillespie 2007b:44-49).⁵² The distribution of the instruments of production is

50 This proliferation is what the Bit Torrent p2p protocol exploits – you almost never download from a single peer, but from a swarm of seeders in possession of the data that you are yet to download.

51 See e.g. Benkler (2006), Weber (2004) and Lessig (2001) for analyses of peer-production and open source. From a business perspective, Jeff Howe (2006; 2008) uses the term “crowdsourcing” for almost the same phenomenon. In Howe’s definition, however, the labour of crowdsourcing takes over for work that was previously done in-house. The crowd is formally subsumed by capital. Similar to Howe, but from an autonomist Marxist standpoint, Tiziana Terranova (2004:77-80, 91-94) argues that open source production, or for that matter any type of interaction online, is nothing but free labour for capital. Fuchs (2008:148-212) combines these two analyses into the internet economy’s dialectic of “logic of co-operation” and “logic of competition”. The dialectic of information as gift and commodity is subsumed under the antagonistic logics.

52 While there is supposedly network neutrality in that the internet is indifferent to the data routed across the network, internet service providers “practice subtle forms of regulation through such measures as asymmetrical upload and download speeds, which favor a consumption-oriented model of internet use”

also the distribution of speed; the speed of electromagnetic waves is at the disposal of everyone. Capital, rather than losing control over its own velocity to the independent force of speed, loses control to anyone in possession of digital devices and a connection to the internet.

An additional implication of digital objects being hypertrophic is that capital's first barrier – that of consumption – re-emerges. As a use-value the “the product contains a barrier – precisely the barrier consisting of the need for it – which, however is measured not by the need of the producers but by the total need of all those engaged in exchange” (Marx 1973:405). Not only does capital leak surplus-value, but “the market” is saturated because of proliferating digital objects. As we saw in chapter 1, capital can partly overcome this barrier by extending itself in space and creating the world market. By so doing, however, circulation time becomes the final barrier, an absolute limit that capital should not overcome. In digital computer networks, an effect of capital overcoming its final barrier is that the first barrier becomes higher. As a particular digital object proliferates, its commodity equivalent gets an ever higher barrier of use-value.⁵³

The extent of the digital piracy accident

Because the commodity form disintegrates under the pressure of absolute velocity, the main effect of the digital piracy accident is that the circuit leaks value. How much value does the circuit actually leak? I show how much value is lost to digital piracy and the effects this loss has on profits and the rate of profit. Before I proceed, however, it is important to note that in the literature there is considerable disagreement about the extent and impact of digital piracy.

(Karaganis 2007b:259).

53 I recognize that this argument is a Marxist equivalent of the bourgeois substitution argument. The substitution rate is the assumed rate at which someone would choose the genuine/legal commodity over the pirated object. The culture industry often assumes a substitution rate of 100%. While I do not agree with the actual rate, I do believe that there is a substitution effect, which contributes towards the barrier of consumption. If capitalist production was suspended together with circulation time as Marx argues, then the consumption barrier would be meaningless. However, since production based on capital has not been suspended (commodity exchange occurs alongside digital piracy) the barrier of consumption still exists and has become even more difficult to overcome after digital piracy.

While both the phenomenon of digital piracy and declining sales are recognized, the literature does not agree that the two are casually connected. In my review of a selection of the theoretical and empirical literature, the majority of studies found a negative impact on sales and revenue, particularly in the music industry (Tera Consultants 2010; IFPI 2010; 2009; Ahn and Yoon 2009; BSA 2009; BMR 2008; Leibowitz 2006; 2007; Zentner 2006; Peitz and Waelbroeck 2004). Leibowitz (2006) estimates a drop of nearly 30% in US music sales after digitization and Peitz and Waelbroeck (2004) put the worldwide decline in music sale between 1998 and 2002 at 20%. IFPI cites a 30% drop in worldwide overall music sales between 2004 and 2009 (2010:5-6, 18). Based on these studies and others, IFPI claim that “research conclusively indicates that the net effect of file-sharing is reduced purchasing of music” (2010:18).⁵⁴

A few studies dissent and argue that the impact on sales is negligible (Oberholzer-Gee and Strumpf 2007; 2009) or that the consequences are ambiguous and/or difficult to establish (GAO 2010; Karaganis 2007a:233-234; Jones and Lenhart 2004). A study on DVD sales from 1999-2003 found that despite the existence of free movies online, DVD sales had an “explosive growth” due to aggressive pricing (Von Lohmann 2004). Karaganis (2007a:233-234) and Huygen et. al. (2009) point out that it is difficult to isolate digital piracy as the primary cause for the decline in revenues in the music industry since 2000. They note that the decline correlates with the economic downturn of 2001-2002, the end of the transition from LPs to CDs and increased competition with other forms of entertainment, notably computer games and mobile phone services, as well as digital piracy.

54 Digital piracy has also been attributed to having dire effects on the overall economy. The Institute for Policy Innovation (IPI 2007:1) attributes annual losses of \$12.5 billion and 71,060 jobs (and \$2.7 in workers' income) to the US economy to music piracy. Tera Consultants estimated that in 2008 the European Union's creative industries incurred revenue losses of €10 billion and lost 185,000 jobs to piracy. Based on current projection cumulative losses of €240 billion and 1.2 million jobs by 2015 (Tera Consultants 2010:5, 8). However, a report commissioned by the government of the Netherlands (Huygen et. al. 2009) estimates that although piracy rates are considerable, they find that the overall effect on the Dutch economy is positive. In Marxist terms, this means that while individual capitals and branches of production might leak surplus value, overall effect on social capital is increased accumulation.

The reliability of government and industry statistics has been questioned. The OECD (2008) and the US Government Accountability Office (GAO 2010) found that assessments often rely on fragmentary and anecdotal evidence and in some cases even treated “unsubstantiated opinions... as facts” (OECD 2008:67). The assumption of the substitution rate has also been questioned, specifically the one-to-one rate that many studies assume. (Huygen et. al. 2009; Karaganis 2007a:234; Oberholzer-Gee and Strumpf 2007).⁵⁵

Although a direct relationship between digital piracy rates and lost sales is difficult to establish, I accept the culture industry’s claim that lost revenues can at least in part be attributed to digital piracy. While I am skeptical of their actual figures, for the sake of argument I will use both industry claims and academic studies to establish theoretically how much value leaks because of piracy and its impact on profit and the rate of profit. I will base my example on Fuchs (see Appendix 1).

Fuchs’ example covers two turnovers; the original production of the knowledge commodity (software) and the subsequent cheaper reproduction of the commodity. During both circuits, 100,000 commodities are produced and all are sold. The market price of the commodity is €190, which is also the average value of the commodity. The first turnover yields a profit of €52 million and the rate of profit is 0.78. At the second turnover, the average value of the commodity falls to €90 due to the significantly lower investments in the elements of production, particularly labour-power. Although the average value of the commodity is much smaller, the commodity is sold above its value, at the price established during the first turnover. Consequently, the second turnover yields profits of €12 million and the rate of profit is 16.

⁵⁵ A substitution rate of 100% rate is problematic: it requires that (1) the pirated object is almost identical in quality to the real one; (2) its price is equal to the retail price; and (3) the consumer is not aware that s/he is buying a pirated product (GAO 2010). Digital piracy can function as advertising, exposing consumers to music they would not otherwise listen to, which could increase sales. Potential consumers might also sample music to find out whether they like it before making a decision whether to buy, which may affect purchases. Cultural commodities simply being available on a filesharing network can also change willingness to pay for them because pirating is always an option and/or can decrease the ideal price someone would be willing to pay for a piece of music (i.e. marginal utility decreases) (Oberholz-Gee and Strumpf 2007).

I now bring piracy into the example (see Appendix 2 for detailed calculations). I assume a 100% substitution rate and a rate of piracy of 30%, i.e. during both turnovers only 70,000 commodities are sold. At the first turnover the loss in value and revenues to digital piracy is €35.7 million, which leads to a decline in the mass of profits from €52 million to €16.3 million. The rate of profit decreases significantly from 0.78 to 0.24.

At the second turnover, however, the impact of digital piracy is not severe. Although the loss in revenues is the same as the first turnover (€35.7 million), the actual loss in value is only €2.7 million because of the much lower average value of the commodity. Because necessary investments in constant and variable capital are much lower at this turnover (€7 million compared to €67 million of the first turnover), the capitalist still makes substantial profits at €76.3 million, and the rate of profit declines to 10.9. Thus at both turnovers digital piracy makes the circuit leak value, but it is not an existential threat to production based on capital.

If commodities are sold at their value on the second turnover, however, the impact of a 30% rate of piracy is severe. With commodities sold at value during the second turnover, total revenues would be €9 million and profits €2 million. The leakage of value to piracy would still be €2.7 million; revenues fall to €6.3 million. Because investment costs are still €7 million, digital piracy would lead to a net loss of €700,000.

The implication of this example is that those branches of production affected by digital piracy must sell their commodities above value in order to profit and accumulate capital. The example strengthens Fuchs' argument that selling commodities at above value is the value-theoretical mechanism for capital accumulation online. Indeed, the digital culture industries are selling their commodities above value: the price to download a digital commodity is typically very close to its material counterpart.⁵⁶

If commodities are not sold above value, the other alternative is to intensify the labour process because the rate of profit is sensitive to the rate of surplus value. In the

⁵⁶ For example, to download a newly released movie from the iTunes Factory it typically costs \$20 or \$25 for the high-definition (HD) version. On Amazon.ca the price for physical DVDs are around \$20-25 and \$30 in the HD Blu-ray format respectively. At a Best Buy Store in real space, the price of a DVD is approximately \$20-25, and \$35 for Blu-ray discs.

above example I assumed a rate of surplus-value of 100%, which results in a mass of surplus-value of €2 million during the second turnover. With a rate of surplus-value of 150%, the mass of surplus-value increases to €3 million and revenues increase to €7 million. The capitalist breaks even. The rate of profit increases from a negative value to 0. A rate of surplus-value of 200% increases the mass of surplus-value to €4 million and revenues of €7.7 million. The rate of profit increases to 0.1 and the capitalist now makes a profit of €700,000. The implication of this strategy is that if commodities are to be sold at their value, the entertainment industry must continuously risk investing and intensively exploiting labour to create original knowledge and/or culture and create new value. Considering that 90% of investments are duds, this is not a viable strategy.

While digital piracy is an accident of value and makes “hit-making a riskier and more costly business” (Karaganis 2007a:232), the digital culture industries are still producing based on capital and are profitable.⁵⁷ In the real time of the internet, digital piracy and commodity exchange co-exist: use-values can take off as instant butterflies or capital can metamorphose as normal through commodity exchange. While digital piracy is a fact, so is the capitalist entertainment industry, and the internet is a habitat for both the commodity cocoons of the iTunes Store and the instant butterflies of the Pirate Bay and Rapidshare. The capitalist process of production and circulation based on immediacy is in contradiction to digital piracy's proliferate production and consumption process based on simultaneity.⁵⁸

This contradiction is interesting considering that I argue that digital piracy occurs when capital achieves absolute velocity, which, according to Marx leads to the suspension of circulation time and consequently to the end of capital. While I agree with Marx that logically the suspension of the sphere circulation negates capital, the fact that absolute velocity has been reached in the branches of production with accidentalized commodities, but has not resulted in the end of production based on capital requires a re-articulation Marx's argument.

⁵⁷ The main source of profit for the culture industries come from real-space commerce (IFPI 2010).

⁵⁸ For an extended discussion on this contradiction, see Appendix 3.

I argue that the co-existence means that circulation time is suspended for only a part of the value advanced in the first stage and valorized in the second stage of the circuit. Assuming that there is a substitution rate, the suspension of circulation time affects only the aliquot part of the commodity-capital that digital piracy substitutes.⁵⁹ This argument makes sense in relation to digital piracy being an accident of value, which I defined as the circuit leaking value. I refer to commodity-capital because it is in the third stage of the circuit that digital piracy first occurs. One part of the commodity-capital can reach absolute velocity and take off as instant butterflies through simultaneity, while another part remains in the commodity form and metamorphose into money because it sticks to the speed limit of capital.

That capital has not been suspended means that the digital piracy accident is not truly generalized. While generalized in the sense that it affects the entire circuit and is glocal in its extent, it is, at least yet, not catastrophic. If businesses were to sell all their commodities only in real time, the internet's exchange setting remains set to "free" and future generations grow up with the idea that digital objects can simply be downloaded for free, then digital piracy could become a generalized accident. Marx's argument about the suspension of circulation time by absolute velocity can thus be taken to refer to the possible and perhaps inevitable end of production based on capital in those branches of production that rely solely on accidentalized commodities.

Even though no definite link between decline in sales and digital piracy has been established, and the sale of knowledge and culture commodities is profitable, digital piracy appears as a massive problem to representatives of the culture industry. A comment from Geoff Taylor, CEO of the British Phonographic Industry (BPI), on the success of the UK digital music singles market is revealing:

That singles have hit these heights while there are still more than a billion illegal downloads every year in the UK is testimony to the vibrancy of the download

⁵⁹ Marx argued that the "original product is divisible into independent and homogenous partial products" (1978:169). The implication of this argument is that the circulation time for aliquot parts of the mass of commodities produced can vary. One part may be shipped to overseas market, while another part is sold at the point of production. In one market the barrier of use-value is high, but in another low because of successful marketing.

market. Consumers are responding to the value and innovation offered by the legal services and these new figures show how the market could explode if the government acts to tackle illegal peer-to-peer filesharing (qtd. in Guardian 2009).

For Taylor digital piracy appears as nothing but lost surplus-value and profits. Where value can be realized it must be realized, which can only be done if the commodity mediates exchange. The IFPI in their digital music reports (2009; 2010) makes an argument to Taylor's: because pirated digital objects are gratis, digital piracy is "swamping the legitimate music business" (IFPI 2009:4). It is therefore "more than any other factor [is the reason that] the growth of [the] legitimate music sector is being stunted" (IFPI 2010:19). If the IFPI's own statistic of 95% of online music is pirated can be trusted, and the substitution rate is 100%, the digital music market would indeed explode without digital piracy.

Considering that the value of a commodity is established by socially necessary labour time (the social average duration of producing one commodity within a particular branch of production), the digital pirate price of zero (or close to zero) is closer to the social average because the labour that goes into reproducing the digital object is clicking on a download link, a moment without duration. Apart from the cost of the digital device and the internet connection, the pirated object is for all intents and purposes free. In other words, the socially necessary labour time to re-produce digital data is negligible.

Consequently, if the music industry is, as they fetishistically claim, "competing in a rigged market" (IFPI 2010), it should start selling its commodities equal to their value or at prices far below the current price. Even with the competition of free by digital piracy, however, the price of, for example, the music album (adjusted for inflation) has nevertheless been constant for nearly a decade (Leibowitz 2006). The price cost of downloading a music album from the iTunes Store (approx \$10) is close to the cost of the physical CD from a retail store in real space (approximately \$12-15). However, as I argued above, selling commodities at their value in a digital environment might very well lead to a net loss and to digital piracy outcompeting capitalist enterprises rather than the other way around.

To the IFPI and Taylor, digital piracy appears as a real or imagined stock of unsold commodities, i.e. as capital frozen in the commodity form. Whether any actual products stand still and remain frozen in the commodity form on real-space shelves in warehouses and retailers (or are yet-to-be-produced digital commodities stored on a server) is inconsequential to the capitalist who accepts the substitution argument: more surplus-value might have been realized. Dromologically, the absolute velocity of digital piracy can be understood as a relativistic effect on the circulation of capital. From the point of view of the consumer that pirates a commodity, the digital object moves so fast that it completely bypasses the moment of exchange. To the capitalist, however, it appears as if the movement of capital, at least for an aliquot part, has stopped completely or slowed down drastically. If, as suggested by Einstein, speed expands time in the instant it contracts space, the time that capital spends in the commodity form is increased, which slows down the metamorphosis of capital. At absolute velocity, when real space has contracted completely, capital comes to a halt.

What is really at stake with digital piracy, however, is more than current sales; it is the commodification of culture as such. The culture industry is concerned about a future in which people grow up with the idea that culture is not something that is bought. In the culture industry's utopia all cultural expressions are commodified. Former CEO of Time-Warner, Richard Parsons, articulated the challenge of digital piracy as "an assault on everything that constitutes the cultural expression of our society. If we fail to protest and preserve our intellectual property system, the culture will atrophy. And corporations won't be the only ones hurt. Artists will have no incentive to create" (2000 qtd. in Gillespie 2007a:108).

Parsons is concerned not just about lost sales, but about the production of culture based on capital. Artists will have no incentive to create if and only if culture and labour-power is commodified. In a society where the commodity form is generalized, artists rely on and must sell their labour-power just like everyone else. If culture workers cannot make a living and are forced to sell their labour outside the culture industry, and culture will atrophy because of digital piracy disintegrates the commodity form, the problem is

the commodity form and production based on capital. Digital piracy is not the problem. It is the capitalist tyranny of value that destroys culture and prevents artists to achieve their creative potentials. Cultural expressions and human creative potential in general is constrained and frustrated when commodified.

The culture industry is concerned about digital piracy because it has lost control over the commodity form and the speed at which capital circulates. This accident of value must be eliminated or at least alleviated. The only way in which capital can stop value leaking is to decelerate or stop the proliferation of digital objects and/or keep the commodity in its form. Just as there are various media, capital can use to increase its velocity of circulation, there are media that can be used to decelerate circulation. In the real-time ecology of the internet, DRM is such a medium. Its function is to slow down the circuit by keeping the commodity in its form. Apart from being a particular medium in relation to the circulation of capital, the design, implementation and continuing popularity of DRM, despite its failure, is a salient example of the commodity form being the main concern of the culture industry.

Digital Rights Management

By implementing various anti-piracy measures, though these measures could just as well be called anti-accident or pro-commodity measures, the culture industry demonstrates that it is aware of the accident and is planning for it. While the accident was made absolute through digitization, the accident-as-disaster is made absolute at that moment when it is planned for and taken into account as the substance is invented and produced.

Although I only consider DRM⁶⁰ in this thesis, it is not the only measure that makes dromological sense. Internet traffic management and streaming have also been suggested as anti-piracy measures, but due to space constraints I will not deal with them

⁶⁰ DRM was in the past referred to as copy-protection measures or technical protection measures.

According to May digital rights management is used because it has fewer negative connotations. (May 2007:1).

in this thesis.⁶¹ My discussion of DRM is neither meant to be exhaustive nor to present in-depth discussions of particular technologies. I consider DRM in general terms in order to consider how and why it can mitigate the digital piracy accident both in terms of speed and the commodity form.

DRM is an umbrella term for both the technical applications of encryption and copy-protection, and the legal and commercial arrangements they require. DRM is typically considered as a technological fix intended to shore up and extend IPRs in a digital environment (Gillespie 2007a; May 2007; Rimmer 2007; Lessig 2001). Although I recognize that law is important in understanding both digital piracy and DRM, my focus is on circulating capital's speed and forms. I argue that DRM is an anti-accident and pro-commodity technology that keeps the digital commodity in its form by programming real-space characteristics and the moment of exchange into the digital object itself. DRM is thus a contrivance similar to those listed in chapter 1 (pp. 30-31), the key difference being that DRM decelerates rather than accelerates. Whether a contrivance accelerates or decelerates, however, they all connected to the functions of capital's forms (see Afterword).

May divides DRM into a continuum between the ideal types of “soft” and “hard” DRM (2007:67). May describes control in soft DRM as “post-use, based on punishment for infringement, and the subsequent deterrence of future possible infringers,” which depends on user registration, monitoring of user activity and identification of non-authorized users (May 2007:71-72). Examples of soft DRM include shrink-wrapped or click-wrapped⁶² licenses that consumers must agree to before using the commodity. This type of DRM is inherited from real-space commodity exchange; in real time, soft DRM cannot decelerate the velocity or limit the actual proliferation of digital objects. Other examples of soft DRM include: demands for compensation from individual pirates and companies; lawsuits against internet service providers (ISPs), websites, owners of p2p

61 For a brief discussion on these anti-accident measures, see Appendix 4.

62 End User License Agreement (EULA); Terms of Service (TOS).

software and/or networks; and forcing ISPs to disconnect digital pirates.⁶³ Soft DRM thus targets a node in the distribution network of digital piracy, which consists of actual individuals, their devices and the application (Napster, Limewire, DC++) or websites (torrent trackers like Isohunt or the PirateBay or webblockers like Hotfile) that link them together⁶⁴.

Hard DRM, according to May (2007) and others (Doctorow 2007; Gillespie 2007a; Betancourt 2006; Lessig 2001) is a “technical fix” to digital piracy. DRM operates either as part of a license/access system or as an embedded control system that pairs an encrypted digital commodity with a digital device in order to make unauthorized uses impossible.

Although early forms of DRM did try to restrict copying outright, limiting the quantity of illegal copies can at best be sufficiently frustrating to the consumer to drive them towards purchasing the digital commodity. While owning a material object confers access and the ability to alienate it to others, it is possible to possess a digital object as a computer file, but to not be able to access its contents and uses. When all objects are originals and possession and use are not exclusive, copyright in its technical implementation becomes an issue of access, i.e. “the right to read, rather than to own a copy” (Betancourt 2006). Encryption is the essence of DRM because copies might very well be easily made, but be restricted to a limited number of digital devices or to the user in possession of the key that unlocks the content.

Because digital objects are numerical expressions they are programmable and subject to algorithmic manipulation.⁶⁵ Encryption is a security technique that takes advantage of this feature of the digital; it distorts the digital object mathematically. It

63 This practice is often referred to as “three strikes”: if an internet connection is found to have pirated copyrighted material three times the ISP cuts the connection. Few ISPs have implemented a three strikes policy, but Ireland’s largest provider, Eircom, is a notable exception. After three strikes the “offender” will receive a seven day ban and a fourth strike means a one year disconnection (Enigmax 2010).

64 From the culture industry’s point of view it makes perfect sense to use such an anti-piracy measure if we compare it to maritime piracy: whereas Somalian pirates prey on the real-space distribution networks of capitalism, Swedish pirates are the distribution network in real time.

65 Compression of audio files to the mp3 format is an example of algorithmic manipulation.

encrypts the commodity before it is sold; the purchaser gets the tools for unlocking its use-value when it is bought. The decryption key typically comes with the playback hardware (e.g. DVD player) or is distributed with the content when it is purchased (e.g. password or CD-key) Without the decryption key, the digital object is useless for the consumer and consequently it does not matter whether it proliferates (Gillespie 2007a:7, 51-57; May 2007).

In its simplest form, DRM consists of a password or a key that must be entered before the product can be used, or in the case of software, installed. In some cases, DRM requires the user to have an authenticated CD or DVD of a game in order to play. Current DRM, however, pairs the digital commodity with a “trusted” digital device(s) that decodes and plays the object and also obeys the limitations placed on its use. With encryption, DRM can proscribe how, when and where the digital commodity can be bought, experienced and used and shared. DRM is therefore designed to regulate what can be done with the content as well as excluding use; it manages the use-value particular to a commodity. For example, the InTether DRM-system developed by InfraWorks is described as follows by its CEO:

Using the packaging software, the originator can determine how many times the recipient can view or play the file; whether the recipient can alter it and send it to others; the identity of permissible recipients (determined by ID numbers and passwords); whether the file can be printed freely, once, or never; how long the file can be viewed or played (in hours or minutes); the date on which the file can first be opened; and the date on which the file will self-destruct and vanish from the recipient’s hard drive... the consumer will not be able to use certain commands – typically the “copy,” “print,” “cut,” “paste,” and “save as” commands (qtd. in Gillespie 2007a:53).

With DRM it is possible to charge a price for particular uses, number of uses or for a bundle of rights granted. Any and every use of a DRMed object can be tagged with a price (Gillespie 2007a:248; May 2007). By binding use-value to exchange value, DRM keeps the commodity in its form. The useful quality of the commodity is locked away until opened by the universal key of money. In the digital world, DRM illustrates Marx's

argument that “commodities must be realized as values before they can be realized as use-values” (1976:179). What DRM systems promise is the possibility of putting an exchange value on any and every possible use-value of the commodity, which is radically different from the single exchange value of the real-space commodity.⁶⁶

DRM tries to exploit the benefits of real time and generalized arrival. When an exchange value is placed on every possible use-value through a DRM system linked to an always online micro-payment scheme, every use of the digital commodity would be a financial transaction. With such a system “digital property can be anywhere on the planet without the knowledge of its creators and still make money for them whenever it is used or copied” (Stefik 1996, qtd. in Gillespie 2007a:55). In other words, the “loci of exchange” are not only attached to the digital commodity itself, but to its specific use-values. Gillespie argues that the end game of such a successful implementation will make “every encounter with a cultural work into a financial transaction” (2007a:11).

Consumption of culture will be based on “fared use”: one price to watch, read or listen and another to copy or edit. Payment could even be extracted for every second of watching or listening or for every word copied or read.⁶⁷

Jussi Vuorinen argues that DRM transforms digital objects into unique material objects by tying the “binary code to its matter base. [Copy protection] glues it to the material world, where perfect copies are impossible” (2006:29). The digital object is turned into a real-space, substantial artefact. In Virilio's terms, the effect of DRM is the same as migrating digital objects from real time into real space where accidents are

66 The possibility of charging a price for every use of the DRMed object explains why DRM systems have been so persistently popular among copyright owners despite the abundant evidence that DRM systems almost always fail (Gillespie 2007a:248-251).

67 With internet users being always online, a DRM system connected to an automated micro-payment scheme (e.g. through a credit card or Paypal), the consumption of digital commodities would be as effortless and convenient as to pirate the object, though only if one has sufficient money. In this case, the moment of exchange would, on a phenomenal level, disappear into the act of consumption (similar to how we consume, say, electricity). Is this form of DRM a form of what Virilio would refer to as a strategy of deception? In this case, I suspect that because the sale would be automatic, it would occur at absolute velocity. At one point, the initial authorization of payment most likely, the brief temporal lag of the moment of exchange would be an interruption. The moment of exchange could also reappear, for example if the seller wanted to increase the price, the consumer wanted additional uses of the object, or if the consumer were to run out of money.

relative and contingent upon a substance. DRM gives real-time objects real-space characteristics, such as mass and uniqueness, and re-introduces the real-space concepts of fakes and counterfeiting in an environment where the distinction between original and copy has collapsed. As a real-space artefact, the digital object must slow down, if not to relative speed, then at least to the speed limit of capital. As May argues, DRM is not part of the “digital revolution” but is implemented as a bulwark against its effects and is a strategy by the culture industry to retain a business model that predates digitization (2007:71).

The introduction of DRM is an anti-accident measure that the culture industry uses to regain control over the circulation of capital and keep the commodity in its form. By programming the moment of exchange into the commodity itself, the velocity of proliferation of use-values is decelerated so that they are forced back to the orbit around capital and value. Every single commodity is a “locus of exchange.” Where the iTunes Store imposes the moment of exchange before production, DRM imposes the moment of exchange before consumption and is indifferent to whether the consumer is in possession of the object or has to produce it after the sale. DRM works on the same principle as the iTunes Store; by inserting the moment of exchange before the object is produced, circulation time remains a deduction from production time, and the benefits of the simultaneity and ubiquity of real time is exploited. However, DRM goes even further by turning specific use-values of the object into a potential moment of exchange. Ideally, DRM gives the commodity-producer complete control over its use-values, ensuring that the commodity will never circulate in ways counter to the producer's interests.⁶⁸

In relation to the circuit and from the point of view of capital, DRM is a necessary speed bump. While DRM appears as an ideal anti-accident measure, the systems have nevertheless proved to be far from successful. DRM systems are almost always cracked or subverted.

The programmability of digital objects enables “cracking” or reprogramming to

68 I should note that DRM cannot cull the population of instant butterflies. It is a post-hoc measure that must be programmed into the commodity by its owner.

remove or circumvent DRM. Although breaking encryption is not always straightforward, the problem with DRM is that it is part and parcel of the digital commodity and therefore comes with everything needed to crack it (the cipher, cipher-text and key) (Doctorow 2004:7). Crackers are extremely effective at breaking DRM-systems; most are cracked in minutes or hours and sometimes days, but it rarely takes a month or longer (Doctorow 2004:7). As soon as the DRM is cracked and released, it is cracked everywhere and for everyone.

The cracked digital commodity's binary code is modified to cause or prevent an occurrence when the file is executed. These occurrences are typically related to copy protection, trial version, serial number, hardware key, data check, date check, CD checks etc., in short anything that restricts the free use of the object. Rather than being distributed with DRM, the digital object comes with the crack (e.g. a NoCD patch) that replaces or circumvents the DRM. Alternatively, the digital object's DRM can be decrypted using software particular to a specific type of encryption or content format so that the use-value may be played on any device. For example, DeCSS is a program that decrypts the content scrambling system (CSS) on DVDs so that they can be played on any (non-licensed) hardware. Another method is to use special software (e.g. CD Protection Detective) to scan for the copy protection application that comes with the digital commodity in CD or DVD format. After the application is found another software tool can be used to remove (e.g. unSafeDisc) or emulate (e.g. DAEMON Tools) the application from the executable file of the digital object, which can then be copied to a hard drive using yet another software application (e.g. Alcohol 120%) (Game Copy World 2010; Vuorinnen 2007; Lessig 2001). Simple forms of cracking include developing and distributing key-generators for software and games or making a set of keys available on a website. Although it requires a highly computer-literate person to break a DRM system, all the knowledge needed to enjoy the fruits of the labour of crackers is how to download a file. Once use-values are freed from their DRM shackles and commodity form, they can take off as an infinite number of instant butterflies.

Vuorinnen argues that just as DRM ties digital code to its material base, cracking releases the digital object from its material base (2007:29-32). Cracking does the opposite of what DRM proposes to do. It sets the use-value free by accelerating it up to absolute velocity, thereby stripping the commodity of its form and bypassing the moment of exchange.

Software developers are locked in a struggle over the commodity form with crackers and hackers, and constantly have to develop techniques such as code obfuscation or stronger encryption that make cracking more difficult. Designers of DRM try to make their system BOBE-resistant⁶⁹ and to further strengthen DRM, content owners have even managed to get laws passed in regional (EU) and national jurisdictions (US and UK) in order to protect DRM by making it illegal to circumvent. Under the digital millennium copyright act (DMCA) it is a criminal offense to circumvent copy protection (Gillespie 2007a; May 2007:51; Biddle et. al 2002). Legal protection itself, however, does not prevent cracking and can, in any case, be done in a jurisdiction where there is *de facto* no enforcement of IPRs.

Biddle et. al. (2002) argue that efforts to solve the problem of digital piracy with DRM are doomed to fail. They base their argument on three assumptions about the digital environment: (1) any widely distributed object will be available to a fraction of users in a form that permits copying; (2) users will copy objects if it is possible and interesting to do so; and (3) Users are connected by high-bandwidth channels (Biddle et. al. 2002:2). The implication of the first assumption is that content will be leaked because (a) any DRM system is essentially useless and can and will be cracked, or (b) the content is made available for reproduction before it is cocooned with DRM (Biddle et. al. 2002:2). The other assumptions imply that once a DRM system is cracked it is useless because a limitless number of copies can be made from a single cracked commodity. The frequent announcements of “unbreakable DRM” and the subsequent crack just hours or days later verify Biddle et. al.'s hypothesis and their arguments that using DRM to protect digitized cultural commodities is essentially a waste of time and resources, and that digital piracy

⁶⁹ Break-one, break everywhere.

will remain a fact of life. Hackers and crackers have been extremely successful in breaking DRM systems, which suggests that DRM can do very little to constrain unauthorized uses and that digital piracy will be difficult to stop by technological means.

Afterword

I have argued that digital piracy is a consequence of the acceleration of circulating capital, when capital breaks its own speed limit of immediate real time. Capital's need for speed derives from its desire to eliminate the dead time it spends in a particular form and stage, when capital is not in movement and is negated as capital and devalued as value. Because capital proceeds in real space and posits space and circulation time as barriers to its free functioning, the speed of the means of communication and transport contributes the most towards reducing capital's dead time.

When capital accidentalizes the commodity and relies on tele-technologies for circulation, it can travel at the speed of electromagnetic waves and achieve absolute velocity of circulation. At this speed, capital leaves the real space of matter and migrates into the electronic space of real time. When capital achieves absolute velocity, it crashes into the wall of real time, causing the digital piracy accident. In real space, the circuit of capital's stages proceed successively in time and at geographically removed locations. A condition for production based on capital is that there must be latency between capital's various moments, and circulation time must be a deduction from production time. Digital piracy occurs when these two conditions are not met. In real time, the circuit's stages are compressed into an intensive moment of generalized arrival. Because the stages occur simultaneously, circulation time is suspended. When this happens, use-values proliferate at absolute speed and can bypass the moment of exchange, resulting in the elimination of both the moment of exchange and the commodity form. The accident reverberates throughout the circuit, so that the capitalist dialectic of production and circulation is replaced by a non-capitalist dialectic of production and consumption. Although the suspension of circulation time should lead to the negation of capital, it is only suspended for an aliquot part of capital. Assuming a substitution effect, the circuit that originally produced the pirated use-values will leak value.

To the culture industry, digital piracy appears as parts of their commodity capital

have stopped circulating. To eliminate or alleviate the digital piracy accident, the culture industry tries to either channel consumers into immediate real time distribution platforms, or to keep the commodity in its form through DRM and other anti-accident measures.

Media: the logistics of capital

While researching this thesis, particularly reading Virilio's take on speed and logistics, I had become interested in and started to think about media in terms of logistics. Thus in my doctoral application to the Faculty of Information and Media Studies, I proposed to research and write a Marxist theory of media based on media's logistical function and define what media are in capitalism. Because the circulation of capital proceeds in real space, I conceived of the function of media to move capital as efficiently as possible. This definition is admittedly narrow and reduces media to means of communication and transportation. While I did argue that both advertising and ideology were media, I did not have the theoretical clarity to explain why these two media were logistical.

While researching Virilio's accident argument and conceptualizing digital piracy as an accident of value, the question, what is media in capitalism? kept intruding into my research. I started thinking about anti-accident measures as media. I defined media negatively in terms of accidents of value: media is anything that enables and accelerates the flow of value, and/or keeps value in the circuit of capital. In chapter 3, I list the following “media”: preservation of food, packaging of commodities, ideology, vertical integration and DRM (p. 70). I rejected this negative definition after reflecting on Virilio's argument that with the invention of substance, a specific accident is also invented. All media come with their own accidents. I did consider, however, that media could be positively defined as something that enables and accelerates the flow of value. The “contrivances” I list in chapter 1 reflect this positive definition because I argue they “speed up the various metamorphoses of capital” (pp. 30-31).

Logistics, accidents, contrivances, how Harold Innis and Marshall McLuhan conceptualized media can be connected to Marx's argument about the accidental realization of the circuit to define what media are in capitalism. I now present my notes for a Marxist "value theory of media." Such a theory is necessary because the Marxist literature on media is fragmented because it is theoretically unsatisfactory. As Garnham (1990) argued, Marxist analyses of media and communication are dominated by idealism and the base-superstructure problematic, or are production centric. Although the literature is deficient, Garnham's (1990) "Contribution to a Political Economy of Mass Communication" and Fuchs' (2009a) "circulation" approach are notable exceptions and I consider them as foundational for a Marxist value theory of media. I start with a critique of Fuchs (2009a).

Fuchs asks: "Did Marx have something to say about the media and communication? If so, what exactly?" (2009a:372-373). According to Fuchs, although Marx did not directly analyse media, he had quite a lot to say about the means of communication. Fuchs teases out what Marx (and Engels) wrote about the media, and uses it to develop a typology of media based on their roles. He locates these roles in the circuit of capital, which he argues should be the starting point for a systematic location of media in capitalism (Fuchs 2009a:377). Fuchs' categories of media are: (1) the role of media in commodity production; (2) the role of media in commodity circulation; (3) media and ideology; and (4) alternative media (379-395).

The first category involves: the general role of media technologies for the spatial and temporal co-ordination of production and the spatial expansion of capitalist production; media used for the purposes of rationalization and increased productivity; as the basis for production of media capital and waged knowledge labour, and concentration and centralization in the media sector (Fuchs 2009a:379-382, 393). In the second category, the general roles of the media are to reduce the circulation and turnover time of capital, a means to spatially centralize capital, a means and outcome of globalizing trade, a carrier of advertisements that facilitates sales of other commodities; and the foundation

for capital accumulation in the branches of transportation and communication (Fuchs 2009a:386-389, 393). The traditional base-superstructure approach to media is placed in the third and fourth categories. Ideology is a media commodity that naturalizes capitalist relations of production, but is challenged by alternative media (2009a:379-394).¹

Although I am largely in agreement with Fuchs' approach and impressed with the various phenomena he can account for in his unified theory, I argue that he makes a crucial mistake with his typology. By putting the role of media as “carriers and circulators of ideologies” in a separate category, he does not systematically locate ideology to the circuit of capital. While I agree that the circulation and reception of ideas naturalizes capitalist relations of production, and therefore enables the accumulation of capital and the reproduction of capitalist relations of production, he mistakenly locates ideology in the third stage of the circuit of capital. Ideology is reduced to something produced, bought and sold, and consumed as a commodity. This mistake is surprising considering he correctly locates advertising in the third stage of the circuit because it facilitates sales of the advertised commodities. I believe his mistake comes from a failure to define what media are in capitalism. Fuchs appears to have a rather narrow definition of the media as the means of communication and transport. In the case of advertising, rather than seeing it as a medium itself, he sees it as the role of “media” to carry advertisements.

I argue that ideology is a medium because it enables capital to move through the first and second stages with less friction. In the first stage, the function of ideology is to ensure that labour-power is always at the disposal of capital and that workers believe “there is no alternative” to selling their labour-power as a commodity. In the second stage, ideology, specifically the interpellation of “good subjects” (Althusser 1970) guarantees that the worker will turn up for work every day and that she is productive and causes no trouble while at work. Ideology, and by extension Althusser's ideological state

1 See Fuchs (2009a:393-394) for a list of the specific and general roles of media within the four categories.

apparatuses, are media because they aid capital to metamorphose.

Agreeing with Fuchs that media can be systematically located in the circuit of capital, I argue that a typology of media should be based on the circuit's stages. The categories of media in capitalism are: (1) the function of media in purchase; (2) the function of media in production; and (3) the function of media in the sale. The general function of media in capitalism I define as logistical because media enables capital to move through the circuit. The functions of media therefore include the real movement of capital in time and space, the formal circulation of capital in the sphere of circulation and the real metamorphosis of productive-capital in the sphere of production.

If media can be connected to the circuit's stages, it is possible to connect them to the forms capital assumes in the three stages. In making this connection, I have relied on McLuhan's (1964) conceptualization of media as extensions of man.

In *Understanding Media*, McLuhan argues that an "extension appears to be an amplification of an organ, a sense or a function" (1964:187). Media accelerate existing processes; an extension "add[s] itself on to what we already are" (1964:12). Clothing extends our skin, chairs extend our back, numbers extends of our sense of touch, electricity extends our central nervous system, etc. It is possible to conceptualize capitalist media in a similar fashion, though it is not man they extend. Because capitalism is an integrated system of value, what is extended must be value. How can media be extensions of value?

A simple answer is that because capitalism is a system that mediates value and value cannot appear by itself, media could be conceived as the value-forms of commodities and money. They are extensions because they add themselves to what value already is, and accelerate the process of exchange. Considering that these forms must also be material, anything can be an extension as long as it is an objectification of value. This

definition is therefore unsatisfactory.² Because value that enriches itself with surplus labour is capital, media could be extensions of capital as well as value.

As I explain in detail in chapter 1, Marx conceptualized capital as a circuit, in which value passes through a sequence of metamorphoses that form three stages of a circuit. Because capital, like value, cannot appear by itself and must exist in a different form in each stage, media could be defined as the forms of money-capital, productive-capital and commodity-capital. Defining media as extensions of capital rather than value does not add anything but an economic form. The difference is that next to commodities and money, the production process is specified as a medium, which is an important clue. The production process is a function; it self-valorizes value by transforming the elements of production into a mass of qualitatively, new use-values.

I argue that media extends the functions that capital's particular forms correspond to; they add themselves onto what the forms already are. To paraphrase McLuhan, media are extensions of capital and value because they enable, amplify or accelerate capital's metamorphoses. Because fulfilling the functions enable capital to metamorphose, which is the same as capital completing a stage and moving to the next, I return to the definition I provided above: the general function of media in capitalism is logistical; it enables capital to move through the circuit.

As extensions, the logistical functions of media are external to capital's forms. More precisely, because the forms of capital are internal to the function they correspond to, media are external to the function.³ Returning to my typology, media can be categorized according to how they enable, augment or accelerate the functions of money-capital, productive-capital and commodity-capital. Anything that enables or accelerates

2 The definition could also be confusing; a use-value would be a medium only as long as it objectifies value, but would cease to be a medium after its exchange when it falls into the sphere of consumption.

3 A distinction, which I believe is significant and did not pay close attention to in my thesis, is the relationship between the forms and functions that belong to each stage of the circuit. Marx considers the forms to correspond to different and special functions; not the other way around. Money is a form of capital because it performs the function of means of payment and purchase, not because money inherently has these functions. The form is therefore internal to the function.

money's function as a means of payment and purchase is a medium belonging to the first stage; anything that enables, accelerates or augments the production process is a medium belonging to the second stage; and anything that enables or accelerates the commodity's function of being bought and sold is a medium belonging to the third stage. For example, because advertising enables and/or accelerates the exchange of commodities for money, it is externally related to the commodity's function of being bought and sold. It is logistical because it, albeit together with other media (e.g. transportation), enables capital to move through the third stage.

To further explain why media are logistical and extensions of capital's forms, it is useful to re-consider a passage from the *Grundrisse* where Marx discusses the tension between the inner unity of capital and the accidental realization of the circuit:

The three processes of which capital forms the unity are external; they are separate in time and space. As such, the transition from one into the other, i.e. their unity as regards the individual capitalists, is accidental. Despite their inner unity, they exist independently alongside one another, each as the presupposition of the other. Regarded broadly and as a whole, this inner unity must necessarily maintain itself to the extent that the whole of production rests on capital, and it must therefore realize all the necessary moments of its self-formation, and must contain the determinants necessary to make these moments real (1973:403).

The inner unity and external actualization of capital can be thought of as concentric circuits of capital. The inner circuit represents the inner unity of capital, which is capital appearing as “value that passes through a sequence of connected and mutually determined transformations, a series of metamorphoses that form so many phases or stages of a total process” (Marx 1978:132). The inner unity of capital, its “necessary moments”, is thus identical to the negative unity of capital, in which it assumes and discards “different form[s], corresponding to... different and special function[s]” (1978:132). Media are the “determinants necessary to make these moments real”, which are the external functions that enable capital to maintain its inner unity. Another, albeit more abstract, definition of media is: “anything that maintains the inner unity of capital in external reality.”

Alternatively, the logistical function could also be defined as “overcoming the barriers of capital.” A focus on barriers could be productive considering that necessary labour is a barrier of capital alongside use-value, space and circulation time. Media in the sphere of production, in addition to enabling and accelerating the real transformation of capital, is anything that lowers the barrier of necessary labour. In short media enable production of relative surplus value. Fuchs makes such an argument by pointing out that the role of media in production is rationalization. The chapters on the production of relative surplus value in *Capital Vol. 1* (Marx 1976:439-639) can thus be interpreted as discussing media.

Overall, the function of media in capitalism enables capital to complete a particular stage and a turnover without losing value. At this point I re-introduce the accidents of value to argue that media consist of an internal contradiction of logistical function and accident. Every medium comes with a specific accident. For example, in the case of the medium of ideology, the accident is bad subjects, i.e. the militant or useless worker. In the sphere of production, the generalized accident of the increasing realization on dead labour is the negation of capital, which is spelled out in the “Fragment on Machines.”

Based on a definition of media as logistical, media can be understood as broader than the lay definition of print and broadcast media, or, for that matter, Marxist definitions that reduce media to its ideological function. Because the logistical function of media point back to the functions that the forms of capital correspond to, media in capitalism include ideology and institutions (specifically Althusser's ideological state apparatuses), forms of organization, (e.g. just-in-time production), the actual market, advertising and fashion, credit, DRM, internet traffic management, planned obsolescence, digital code, packaging, radio frequency identification (RFID), etc. Media need not be sensuous, material objects. Here I owe a debt to Innis. He broadened the category of media to include organizations, institutions and technologies. For him, the price system, coinage, horses, radio and the university are media according to Innis (Innis 1982; Comor

1994; 2001). If not for Innis' conceptualization of communications media, I might not have had the academic courage to define ideology, forms of organization and institutions as media.

It is possible to bring Innis' space and time biases into a value theory of media.⁴ According to him, media that emphasize time are durable, such as the spoken word, stone and parchment, but are difficult to move. Space-biased media on the other hand, can be easily transported, such as paper and electromagnetic waves, but do not survive because they are fragile and deteriorate easily (Innis 1982). When Innis uses the concept of bias, he refers to the “physical characteristics of media – characteristics that are never comprehensible outside the social-economic context of their use” (Comor 1994). This focus on physical characteristics can easily be connected to the material forms of value and capital have to take, specifically the commodity form. I suggest that the concept of bias in the socio-economic context of the circulation of capital can be used to analyse whether the material forms capital must assume make it more or less difficult for it metamorphose. For example, a heavy, fragile and weirdly shaped commodity will be more difficult and costly to circulate. A commodity that is light and can be easily packaged will move relatively quicker than a heavy and fragile commodity. In this thesis, I have argued that notwithstanding its digital piracy accident, digital code is the ideal “material form” of capital because it allows capital to accelerate absolutely. A space-bias can be, and often is, built into the commodity; a short life span lowers the barrier of use-value and guarantees repeated sales. Although the commodity itself is space-biased, the logistical functions are external and stem from the media of planned obsolescence, terminator seeds, fixed expiration dates in printer cartridges and fashions.⁵

These fragmented notes I offer here as an afterword provide me with a point of departure for my doctoral research. To really get at why the function of media in

4 I believe that I could have used Innis' bias in this to explain many of the phenomena Virilio associates with real time, particularly the annihilation of time.

5 Building commodities that are time-biased, however, may be a competitive advantage for individual businesses. I argue, however, that generally capital is space-biased, focused as it is on short-term gains.

capitalism is logistical and define what capitalist media are, it is necessary to take inspiration from other media theorists. Although I have so far considered only Innis, McLuhan and Virilio, for my dissertation research I would consult literature by theorists such as Friedrich Kittler,⁶ Alexander Galloway, Lev Manovich, Langdon Winner, Jaques Ellul, and Bruno Latour. I believe that consulting the businesses literature on logistics and supply chain management can also yield insights. Perhaps we will meet again.

⁶ See note 43, p. 94 for how Kittler's concept of discourse network can be used for a periodization of the circulation networks of capital.

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Appendix 1: Fuchs' example of capital accumulation online

Fuchs (2009b:398-399, see also 2008:175-177) uses the following example to demonstrate why and how selling commodities at above their value is the value-theoretical mechanism for capital accumulation on the internet.

Imagine the production of a mass software with a certain turnaround time. The production time of the necessary knowledge is best assigned to the first turnover period of capital. We assume that all copies are sold, that a profit is already achieved after the first turnaround, and that there are no interest and rent to be paid. Let the market price of one piece of software be 1190 €. We have to distinguish the constant and variable capital in the production of knowledge (c_1 and v_1) from the capital involved in the physical reproduction process (c_2 and v_2). Let us also assume that at the first turnover 100,000 pieces of the commodity are produced, that $c_1 = 10 \cdot 10^6$ €, $v_1 = 50 \cdot 10^6$ €, $c_2 = 5 \cdot 10^6$ €, $v_2 = 2 \cdot 10^6$ €

The total investment costs are $67 \cdot 10^6$ €. We assume a rate of surplus value of 100 percent. The mass of constant capital is $c = c_1 + c_2 = 15 \cdot 10^6$, the mass of variable capital $v = v_1 + v_2 = 52 \cdot 10^6$. Due to a rate of surplus value of 100 percent, the mass of surplus value produced is $s = 52 \cdot 10^6$ €. All copies are sold, hence the revenues are $1190 \cdot 100,000 = 119 \cdot 10^6$ €. Subtracting the investment costs from this sum results in a profit of $52 \cdot 10^6$ € in the first year. The average value of a single copy is $v = c_d + v_d + s_d$, where c_d , v_d , and s_d describe the average proportions for one commodity of the total constant and variable capital as well as of the total surplus value produced. The average commodity value is

$$v = (15 \times 10^6 / 10^5) + (52 \times 10^6 / 10^5) + (52 \times 10^6 / 10^5) = 1190$$

In this example, the value of the commodity equals its market price. Let's take a look at the second turnover of capital: We assume that the conditions of production, the costs, and the total amount of produced commodities remain the same. How does the profit develop? The investment costs for knowledge production do not have to be spent by the capitalists this time due to the specific characteristics of information ($c_1 = 0$, $v_1 = 0$). Hence the average commodity value is reduced to

$$v = (5 \times 10^6 / 10^5) + (2 \times 10^6 / 10^5) + (2 \times 10^6 / 10^5) = 90$$

This means that the average value of a single piece of software has massively decreased without a change in the conditions of production!

This is due to the fact that knowledge only has to be produced once. It only has what Marx called a 'moral' devaluation, but does not lose value by aging, use, or nonuse; it can be reproduced easily and at very low costs. The software is still sold at 1190 €, hence the profit increases from $52 \cdot 10^6$ € to $112 \cdot 10^6$ €. This amounts to an increase of average profit from 520 € to 1120 € per commodity and an increase of the profit rate from 0.78 to 16 (profit rate = $\text{profit}/(c+v)$)! This example shows that the value of a piece of software is much lower than its market price and that the specific characteristics of knowledge favor capital accumulation in the knowledge and software industry.

Appendix 2: The impact of digital piracy in Fuchs' example

Fuchs assumes that all commodities are sold at their value. The market price of the commodity is 1190€. Total investment costs (C) are $€67 \cdot 10^6$ (mass of constant capital (c) $€15 \cdot 10^6$ + mass of variable capital (v) $€52 \cdot 10^6$). With a rate of surplus value of 100% the mass of surplus value (s) is $€52 \cdot 10^6$. At the first turnover 100,000 (105) physical commodities (q) are produced. The average value of a commodity (c+v+s/q) is €190, identical to the market price. Since all commodities are sold revenues (R) are $€19 \cdot 10^6$. Subtracting C from R results in a profit of $€52 \cdot 10^6$ ($€19 \cdot 10^6 - €67 \cdot 10^6$), which gives a rate of profit of 0.78 (rate of profit = profit/ C; $52 \cdot 10^6 / 67 \cdot 10^6$). Profit is already achieved after the first turnover.

At the second turnover of capital both c and v decrease because the knowledge labour and means of production that went into creating the software does not have to be employed again. Because knowledge is non-rivalrous it only has to be produced once and only the physical reproduction process of an additional 100,000 commodities needs an outlay of value. C decreases to $€7 \cdot 10^6$ as c = $€5 \cdot 10^6$ and v = $€2 \cdot 10^6$. With the rate of surplus value remaining constant s = $€2 \cdot 10^6$. The average value of the commodity on second turnover is therefore €90. Although the average value of a commodity has decreased significantly, the commodities are still sold at the market price of €190; consequently profits on second turnover increase to $€12 \cdot 10^6$, and the rate of profit rises to 16 (See Appendix 1).

If we accept a piracy rate of 30%, i.e. only 70,000 commodities are sold, the loss in value to digital piracy (dp) during the first turnover is $€35.7 \cdot 10^6$. Because this figure represents the quantity of value of commodities that were not sold this figure must be deducted from revenues before profit is calculated. This means that profit falls to $€16.3 \cdot 10^6$ ($€19 \cdot 10^6$ (R) - $€35.7 \cdot 10^6$ (dp) - $€67 \cdot 10^6$ (C)). The rate of profit falls to 0.24 ($16.3 \cdot 10^6 / 67 \cdot 10^6$). On the second turnover, however, a 30% piracy rate will have a smaller impact on revenue and on the rate of profit because of the much lower necessary outlay of value while commodities are still sold at their market price. Revenues would be

$\text{€}3.3 \cdot 10^6$ ($\text{€}19 \cdot 10^6 - \text{€}35.7 \cdot 10^6$) and profits $\text{€}76.3 \cdot 10^6$ ($\text{€}3.3 \cdot 10^6 - \text{€}7 \cdot 10^6$). The rate of profit would be 10.9. In value terms the impact of piracy would be much lower. Since the value of the commodity is $\text{€}0$, the loss in value to piracy would be only $\text{€}2.7 \cdot 10^6$ compared to $\text{€}35.7 \cdot 10^6$ on the first turnover.

If commodities were sold at their value, a piracy rate of 30% would severely impact profits and the rate of profit. Without piracy total revenues are $\text{€}9 \cdot 10^6$ and profits are $\text{€}2 \cdot 10^6$ ($\text{€}9 \cdot 10^6 - \text{€}7 \cdot 10^6$). With piracy total revenues would fall to $\text{€}6.3 \cdot 10^6$ and result in a net loss of $\text{€}0.7 \cdot 10^6$.

Appendix 3: The temporal contradiction of real time and its relationship to the contradiction between gift and commodity exchange

The temporal, real-time contradiction between immediacy and simultaneity is the fundamental contradiction of the internet economy, which others have conceptualized as a contradiction between or symbiosis of gift and commodity exchange (Fuchs 2008:157-212; 2009c; Barbrook 2005; see also Currah 2007; Leyshon 2003). Both Barbrook and Fuchs' conceptualizations include the exchange of labour-time (e.g. open source software, message boards and social networks), not only digital objects.

Barbrook (2005) argues that the non-rivalrousness, the low cost of copying and the architecture of the internet are reasons for the existence of the high-tech gift economy online. Hyperbolically, he refers to the internet as a “really existing form of anarcho-communism” because internet users collaborate and exchange information without the “direct mediation of money.” This gift economy, however, exists in symbiosis with commodity exchange: “On the Net, the same piece of information could exist both as a commodity and a gift... The free circulation of information between users relies upon the capitalist production of computers, software and telecommunications. The profits of commercial Net companies depend upon increasing numbers of people participating within the hi-tech gift economy.” The major critique of Barbrook's argument is that his theory is not particularly rigorous in relation to either the Marxist commodity or anthropological theories of the gift (see e.g. Mauss 1954; Malinowski 1984). Barbrook considers the gift and commodity to be symbiotic rather than antagonistic.

Fuchs' (2008:157-212; 2009c) theorization of the internet economy as a contradiction of the logics of co-operation and competition is strong where Barbrook is lacking. Rooting his conceptualization in informational capitalism, he considers the contradiction as follows: “Information gifts form a part of the Internet economy in which goods are distributed for free and are openly accessible. Information commodities constitute a subsystem of the Internet economy in which goods are sold and controlled with the help of intellectual property rights” (Fuchs 2008:210). Fuchs maps this

contradiction onto the internal contradiction of the commodity form; the gift onto use-value and the commodity onto value.

In relation to labour, he conceptualizes the contradiction as one between “global co-operative production” and “global outsourcing for reducing c[onstant capital] and v[ariable capital]” (Fuchs 2008:210). Rather than viewing the internet as “really existing anarcho-communism,” Fuchs argues that although the gift transcends the commodity, it is also subsumed under capital. He argues that the contradiction between gift and commodity both undermines and extends capital accumulation online (2008:158-161).

An implication of Fuchs' argument is that the exchange of commodities can rely on digital piracy for capital accumulation. In other words, while digital piracy is a decommodified proliferation of information it is nevertheless part of the circuit of social capital; pirated objects can enter the circuits of capital as gratis raw material for illegal streaming websites that sell the audience commodity, or as advertising for embedded devices, such as the iPod. Social networking sites and aggregators of “user generated content” rely on the free labour supplied by the “immaterial reserve army.”

Although I agree with Barbrook and Fuchs that the internet is a contradiction between gifts (though I prefer the term digital object) and commodities, I argue that the fundamental, internal contradiction is temporal, i.e. between the simultaneity and immediacy of real time. The gift and commodity contradiction is the form of appearance, the external expression of the temporal contradiction internal to the real time of the internet. I base this argument on Marx's argument that exchange “produces a differentiation of the commodity into two elements, commodity and money, an external opposition which expresses the opposition between use-value and value which is inherent in it” (Marx 1976:199). Paraphrasing Fuchs, I argue that the contradiction between immediacy and simultaneity both extends and undermines capital accumulation.

Lawrence Lessig (2008) makes a similar distinction to Barbrook and Fuchs, though he refers to the internet as a hybrid economy. Although Lessig mentions neither commodities nor gifts, his distinction between “read-only” and “read-write” cultures can nevertheless be mapped onto the two economic forms. Read-only culture belongs to the

sphere of copyright and the commodity. To use it permission must be given, typically granted through the purchase. Read-write culture is inherently about sharing and adaptation of content. Lessig's main argument is that although digital technologies make it possible to modify and share cultural object, the copyright of read-only culture constrains read-write culture. Like Barbrook and Fuchs, Lessig identifies online hybrid read only and read write cultures; e.g. YouTube and Last.fm are commercial entities that rely on free (gifted) labour.

Appendix 4: Internet traffic management and streaming

Internet traffic management

DRM does not interfere with internet traffic. It controls the circuit of capital by keeping the commodity in its form irrespective of its proliferation. Since DRM is perpetually cracked, internet traffic management can be used to eliminate or alleviate the digital piracy accident. What is interesting about traffic management when combined with packet sniffing or watermarking is that the digital object can be stopped from moving or generalized arrivals can be completely blocked. There are two ways in which this can be done.

First, generalized arrival can be prevented at the application or transport level, irrespective of what is actually transferred. This method involves blocking IP addresses or domain name server (DNS) names, URLs, specific protocols (p2p), TCP and/or UDP ports that are commonly used by p2p applications or blocking traffic for specific applications. The problem with this approach is that access to or transfers of all files, whether they are pirated or not, is blocked. These measures can be circumvented. For example, if a specific protocol that an application uses is blocked the traffic could be reprogrammed to use another protocol.

Second, specific pirated objects can be detected and their generalized arrival stopped or the digital pirate can be prosecuted afterwards. This type of anti-piracy measure might require that the digital commodity is modified with a watermark, digital signature or fingerprint that can be detected by monitoring traffic through methods like deep packet inspection (DPI). When a file is detected and identified as containing copyrighted content, the file transfer can be stopped (iPoque 2009).

These anti-piracy measures make dromological sense in relation to the circulation of capital. The object is not simply slowed down, but is prevented from arriving. Whereas DRM helps capital to regain control over its velocity as it circulates, it cannot prevent use-values liberated from the commodity form from proliferating at absolute speeds.

A related measure is bandwidth throttling. This method does not actually slow

down the object (which still arrives at the speed of electromagnetic waves), it only decreases the quantity of data that can be transmitted over a certain period of time. The effect is that the duration of a download will increase, but not the speed of the object. Throttling can be applied to specific applications, such as p2p applications or limited to uploading speeds only. Throttling is not directed at digital piracy per se, but is often done by internet service providers (ISPs) to limit network congestion. However, while it is not directed at digital piracy it is an inconvenience and the digital pirate could be driven to legal services.

Streaming

Streaming has been touted as a solution to digital piracy because this form of generalized arrival appears to not leave a copy on the consumer's digital device (Doctorow 2009). While downloading is compared to buying a physical CD or DVD, streaming is compared to a radio or TV broadcast. Streaming allows copyright holders or re-sellers (like Spotify or Netflix) to sell subscriptions to on-demand content. The benefit of streaming compared to downloading proper is that the consumer would not own the streamed work. The consumer would be forced to keep subscribing to the service, re-purchase a particular steam or buy it as a download. The copyright owner can interrupt the stream with advertising to generate additional revenue from the audience commodity. While piracy rates have declined somewhat in favour of streaming, particularly among teenagers who are increasingly using services such as Spotify, Netflix, Hulu and YouTube. Legal streaming services, however, exist alongside for-profit pirate streaming sites and software that rely on pirated digital objects to sell the audience commodity.

The problem with streaming as an anti-piracy measure is, of course, that streaming actually does involve copying and is just a subset of downloading in which a file is sent sequentially in order for it to be displayed before it is completely downloaded or as it is downloading (Doctorow 2009; Silberschatz et. al. 2010:832-833). The difference between downloading proper and streaming is that with the former the data are copied into a non-volatile memory/storage and with the latter the data are copied into the

memory of the computer and/or client software. The client software can be programmed to delete the files from the memory or make the files invisible to the file system. On the other hand, it is quite easy to make a piece of software that does save the data to storage (such as the Video Downloadhelper add-on for Firefox). In some cases it is even possible to copy the temporary file from the browser's cache into storage. Streaming is not a solution to the perennial problem of the analog hole; anything that is played back as an analog data stream can be, albeit with some loss in quality, digitally recorded.

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